SHRI SHIVAJI EDUCATION SOCIETY
MAHASATEE ARTS COMMERCE & SCIENCE COLLEGE
ULGA KARWAR

B.Sc Students undertaking project work/ internship for the academic year 2023-24

Year	Name of Department	Students Register Number	Name of the student	Project Title
2023-24	B.Sc Botany	U02JS21S0001	Sri.Santosh.K.Gavada	Herbal Oil Extraction
		U02JS21S0002	Miss.Swati.U.Kankonkar	
		U02JS21S0003	Miss.Pooja.P.Pagi	
		U02JS21S0004	Sri.Rahul.D.Naik	
		U02JS21S0005	Sri.Roshan.S.Bandekar	
		U02JS21S0006	Sri.Shivanand.K.Achari	
		U02JS21S0007	Sri.Pranay.B.Naik	
		U02JS21S0008	Sri.Yogesh.A.Gavada	
		U02JS21S0009	Sri.Ankush.A.Gavada	
		U02JS21S0010	Miss.Siya.S.Kankonkar	
		U02JS21S0011	Sri.Santosh.Padawalkar	
		U02JS21S0012	Sri.Suraj.Mirashi	
		U02JS21S0013	Sri.Akshay.G.Banavalikar	
		U02JS21S0014	Miss.Sneha.P.Rane	
		U02JS21S0015	Miss.Annapurna.N.Gunagi	
		U02JS21S0016	Miss.Siddhi.S.Gouda	
		U02JS21S0017	Miss.Sushma.R.Gaonkar	
		U02JS21S0018	Miss.Rashika.E.Kotharkar	
		U02JS21S0019	Sri.Vaibhav.V.Devadas	
		U02JS21S0020	Sri.Amith.A.Talekar	
		U02JS21S0021	Miss.Pratiksha.S.Kankonkar	
		U02JS21S0022	Miss.Aishwarya.S.Pednekar	
		U02JS21S0023	Sri.Rohit.R.Bandekar	
		U02JS21S0024	Miss.Manali.S.Naik	
		U02JS21S0025	Miss.Sanchita.S,Manjrekar	
		U02JS21S0026	Sri.Yesudas.P.Naik	
		U02JS21S0028	Sri.Rohan.S.Naik	
		U02JS21S0030	Sri.Kartik.K.Gunagi	
		U02JS21S0034	Sri.Gourav.K.Malwadekar	
		U02JS21S0035	Sri.Gourish.R.Kotharkar	

PRINCIPAL
MAHASATEE ARTS,
COM. & SCI. COLLEGE
ULGA, KARWAR - 581 35

PROJECT REPORT ON HERBAL OIL EXTRACTION

Project Report submitted to the
Karnataka University, Dharwad

For the Degree of
Bachelor of science

Submitted By

GAURAV KASHINATH MALEWADKAR
Registration No: U02JS21S0034

RESEARCH SUPERVISOR

Dr. Vinod V. Nayak
Asst. Professor
Department of Botany
Mahasatee arts, commerce and science college

Ulga, Karwar.

2024

KARNATAK DHARWAD UNIVERSITY

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by--Santosh .D. Padawalkar---------- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---Ankush Ashok Gavada.---------- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled "**PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Yogesh Arjun Gowada is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---Roshan. Subhash. Bandekar is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---AMIT. ATMARAM. TALEKAR--- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---VAIBHAV. VIJAY. DEVDAS--- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by SNEHA PRASHANT RANE is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

External examiner 4/7/2024

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by SUSHMA RAMACHANDRA GAONKAR is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK DHARWAD UNIVERSITY

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---Rohit Bandekar---- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---------Santosh. Kushali. Gavada---------- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Rahul Dnyaneshwar Naik, is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK DHARWAD UNIVERSITY

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by--Manali Sandeep Naik---------- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled "**PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---Suraj Baliosh Mirashi--- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/8/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Bhonay Bhimaji Naik is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

External examiner 14/7/2024

Internal examiner

Research Guide
Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Gourish. Ramachandra. Kothankar is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by PRATIKSHA. SHRIKAR. KANKONKAR is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/3/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by RASHIKA. GANATH. KOTHARKAR is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

External examiner 14/7/2024

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by ANNAPURNA · NARASIMHA · GUNAGI is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Akshay Gurudas Banavalikar is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---Kartik Kiran Gunagi--- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

External examiner 14/7/2024

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by **AISHWARYA ASHOK PEDNEKAR** is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by---Pooja Prashant Pagi--- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024
External examiner

Internal examiner

Research Guide
Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled "PROJECT REPORT ON HERBAL OIL EXTRACTION "Submitted by--Swati U Kankonkar---------- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of DR. VINOD V. NAYAK, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/3/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK DHARWAD UNIVERSITY

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Sanchita Shankar Manjrekar is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK  UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled **"PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by--Shivanand krishna Achuri---------- is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled "**PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Siya .S. Kankonkar is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/7/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

MAHASATEE ARTS COMMERCE & SCIENCE COLLEGE

ULGA KARWAR (U.K)

PROJECT REPORT

HERBAL OIL EXTRACTION

KARNATAK UNIVERSITY

DHARWAD

CERTIFICATE

This is to certify that the report entitled "**PROJECT REPORT ON HERBAL OIL EXTRACTION** "Submitted by Swati U Kankonkar is in partial fulfilment of the course for the degree of bachelor of science under the guidance of **DR. VINOD V. NAYAK**, Asst. Professor, Department of Botany. This work is based on the observation and results of field studies carried out by her. The report is an original work done by the candidate under my supervision. The report or part of the report has not been previously submitted for any diploma.

14/3/2024

External examiner

Internal examiner

Research Guide

Dr. Vinod V. Nayak

DECLARATION

I hereby declare that the work presented in this project report entitled "**PROJECT REPORT ON HERBAL OIL EXTRACTION**" has been carried out by me under the guidance and supervision of **DR. VINOD V. NAYAK** Asst. Professor, Department of Botany, Mahasatee Arts, Commerce and College Ulga, Karwar.

I am submitting this project report to Karnataka university Dharwad as the partial fulfilment of requirement for the award of B.Sc. Degree.

I also declare that this report or part of it has not been previously submitted for the award of any degree, associate ship, fellowship or other similar title.

Date: 14/7/2024

Place: Ulga

Name of the student

Swati. U. Kankonkar

ACKNOWLEGMENT

I would first like to thanks my Guide Dr. Vinod V. Nayak, Ass. Professor, Department of Botany, MACS college Ulga, Karwar. For guide me, understanding my mistakes and correcting me during the completion of this report, and most important for being a good critic and advisor in every aspect of this work.

I would like to thank Miss Priyanka Naik, Lecturer, Department of Zoology, MACS College Ulga, Karwar. For her Guiding and providing a proper knowledge in field work and constat help in teaching me with her valuable suggestion and encouragement during my work.

Finaly, I would like to thanks to my parents and my friends for providing me with unfailing support and encouragement throughout these years.

CONTENTS

INTRODUCTION

Infused herbal oils in simple terms means combining medicinal properties of herbs into a specific carrier oil. This extraction process is called a maceration or infusion. It is where herbs or plant matter are chopped and steeped in carrier oil for weeks or months to get the most out of said herbs or plant matter. Essential oils are called the ethereal or volatile oils, which are fragrant oily liquid that are extracted from the various parts of the plants and mostly used as the food flavours. An essential oil is "essential" in sense that it contains the essence of the different fragrance, and the properties of the plants from which they are derived. These volatile oils showed the different kinds of biological activities including the antibacterial, antioxidant, antiviral, insecticidal, etc… These oils are also used for cancer treatment, while some other has been used for the food preservations, aromatherapy, and in the perfumery industries. The antimicrobial and antioxidant screening of essential oil acts as the root of numerous applications including the processed and fresh food preservations, natural therapies, pharmaceuticals, and alternative medicines. Essential oils are used in aromatherapy as an alternative source of wound healing because of the aromatic compounds that are present in the essential oils. It is also used as a relaxation process, but this evidence is not under consideration. Numerous efforts are made to explore the essential oils usage as the treatment of various infectious diseases that supernumerary to the pharmaceutical's remedies. Medicinal and aromatic plants are extensively used as natural organic compounds and as medicines. Previously, essential oils have been used for the treatment of various sorts of infectious diseases in the whole world. Now, in this era, the importance of essential oils is increasing day by day, because they are mostly used in the beverage and food industries, cosmetics and fragrance industries for making valuable perfumes, and with lot of biological activities.

Essential Oil Industry

The worldwide essential oil market demand was 226.8 kilotons in year 2018. It is expected to expand at a CAGR of 8.6% from the 2019 to 2025. Usage of essential oils in industries are increases day by including the beverage, food, personal care, aromatherapy, and cosmetics. Various sorts of the health-related benefits are offered by essential oils and they are reported as the anticipated fuel and their demand is increasing in the medical and pharmaceuticals applications. The growing inclination of the consumers toward the organic and natural products is leading to increase the use of essential oils in the beverage, food, and cosmetics industries. Worldwide essential oil market will cross USD 13 billion in the year of 2024 the latest report of the Global Market Insights, Inc. The increase in the World population are suffering from the different kinds of health-related issues and essential oils are used in aromatherapy products and due to this reason, the Worldwide market of essential oils are increasing day by day. Changing the standards of the living led to the occurrence of different sorts of mental issues including the depression, anxiety, insomnia, and stress that led to grow the market of essential oils because they are used for the treatment of such kinds of diseases.

Growing trends of essential oils adaptation

The essential oils are the products that are obtained from the plant extracts and have been used for large-scale industrial and homemade products. The major usages of essential oils are pest control products, cleaning actions, and counter medications among the other products and personal care products. Essential oils have various advantages in wound healing, rejuvenation, and relaxation. Alongside their applications in the betterment of the health issues, the most common health issues such as migraines and nausea are cured from the essential oils. It is also used in the food industries because of their preservative potential in contrast to the foodborne pathogens, antibacterial, antimicrobial, and antifungal characteristics.

IMPORTANCE OF HERBAL OIL

Some major essential oils and their applications

Organic oil: Organic oils are produced in remarkable diversity by plants, animals, and other organisms through natural metabolic processes. Lipid is the scientific term for fatty acids, steroids and similar chemicals often found in the oils produced by living things, while oils refer to an overall mixture of chemicals.

Mineral oils: Crude oil, or petroleum, and its refined components, collectively termed petrochemicals, are crucial resources in the modern economy. Crude oil originates from ancient fossilized organic materials, such as zooplankton and algae, which geochemical processes convert into oil. The name "mineral oil" is a misnomer, in that minerals are not the source of the oil—ancient plants and animals are. Mineral oil is organic.

Essential oils: Essential oils are called the ethereal or volatile oils, which are fragrant oily liquid that are extracted from the various parts of the plants and mostly used as the food flavours. These volatile oils showed the different kinds of biological activities including the antibacterial, antioxidant, antiviral, insecticidal, etc. These oils are also used for cancer treatment, while some other has been used for the food preservations, aromatherapy, and in the perfumery industries.

Cooking oil: Several edible vegetables and animal oils, and also fats, are used for various purposes in cooking and food preparation. In particular, many foods are fried in oil much hotter than boiling water. Oils are also used for flavouring and for modifying the texture of the foods (e.g., stir fry). Cooking oils are derived either from animal fat, as butter, lard and other types, or plant oils from olive, maize, sunflower and many other species.

Cosmetics: Oils are applied to hair to give it a lustrous look, to prevent tangles and roughness and to stabilize the hair to promote hair growth.

Religion Oils: It has been used throughout history as a religious medium. It is often considered a spiritually purifying agent and is used for anointing purposes. As a particular example, holy anointing oil has been important ritual liquid for Judaism and Christianity.

Fuel: Some oils burn in liquid or aerosol form, generating light, and heat which can be used directly or convert into other forms of energy such as electricity or mechanical work. In order to obtain many fuel oils, crude oil is pumped from the ground and is shipped via oil tanker or a pipe line to an oil refinery. There, it is converted from crude oil to diesel fuel, ethane, fuel oils, gasoline, and liquified petroleum gas.

Olive oil: It holds a lot of fats within it which is why is was also used in lighting in ancient Greece and Rome. So, people would use it to bulk out food so they would have more energy to burn throughout the day. Olive oil was also used to clean the body in this time as it would trap the moisture in the skin while pulling the grime to the surface. It was used as an ancient form of unsophisticated soap. It was applied on the skin then scrubbed off with a wooden stick pulling off the excess grime and creating a layer where new grime could form but be easily washed off in the omega-3 fatty acid. This fatty acid helps with inflammation and reduces fat in the bloodstream.

Bergamot : The essential oil of bergamot obtained from the peel of the fruits of the Citrus bergamia is known as the bitter orange tree. The extract of the bergamot is used in flavouring in Earl Grey tea and essential oil of this is used also for the same purpose. It is applicable for the treatment of skin diseases, and it improves the mood, relieves pain, reduces fever, treats the digestive system problems, and breaks up chest congestion.

Clove oil: It is extracted from the aromatic flower buds of Syzygium aromaticum tree that is native to Maluku, Indonesia. The essential oil of Clove provides the strong fragrance, used in cooking spice foods; medically, it is used as pain relief, used for the treatment of dental disorders, for nausea treatment, to reduce inflammation, for the treatment of the digestive ailment, and to clear up acne.

Eucalyptus: It is extracted from the different species of genus Eucalyptus. Every type of species contains different and unique usage in every field. The most familiar essential oil obtained from the Eucalyptus globulus has a mint-like fragrance. It is used for decongestant chest rub, as pain relievers, as an antimicrobial agent, immunostimulant, and for the treatment of the flu and cold cough. It is used in aromatherapy and it provides mental clarity; it also boosts up energy and used as a natural insect repellent.

Frankincense: The earliest known and the most useful essential oil is Frankincense and it is obtained from the resin of the four species of the generous Boswellia and the most known from this genus is the Boswellia sacra hard tree which grow in the arid land of Arabian Peninsula and north eastern. The old African people used the essential oil of Frankincense in the religious and spiritual ceremonies. It is used as the mood enhancer, antimicrobial, stress reducer, for faster wound healing, aid in digestion, anti-inflammatory, fades scars, reduces swelling of insect bites, for the treatment of skin diseases, and eases itching.

Lavender oil: The most effective essential oil obtained from the Lavandula angustifolia is the most popular garden herb English lavender. Its odour is same as the flowers from which they are obtained having the sweet smell, floral, and green, and the health benefits are greater as compared to their fragrance. It showed good antioxidant, anti-inflammatory, antibacterial, and antifungal properties, and it is also used for the treatment of various sorts of skin diseases including eczema or ringworm and acne. Lavender essential oil is used to enhance the digestive

system, to reduce the swelling of sore muscles, and to relieve pain. Due to its attractive smell, it attracts butterflies, bees, and some pollinators, and it also acts as a natural repellent for many flying six-legged pests.

Lemon oil: Essential oils obtained from the lemon are mostly used. The essential oil obtained from the Citrus limon is used worldwide. The essential oil of lemon is used as antimicrobial agents, in household items including soaps, polishes, furniture, fresheners, and in most of the cleaning products. Some other uses of these essential oils are that they are the pain relievers, show antifungal activity, help for the loss of weight, and alleviate the severe nausea; the essential oil of lemon is used in aromatherapy to reduce the anxiety and stress and simultaneously enhances the concentration and mood. It is also used for cleaning the hair and enhancing the natural growth of hairs.

Oregano oil: The essential oil of Oregano was obtained from the kitchen spice Origanum vulgare. The usage of the essential oil of Oregano is increasing day by day and it is mostly used for the skin care treatment like eczema, rosacea, and psoriasis. It is used to alleviate the menstrual problems or painful menstrual cramp, used to cure stomach problems, and helps to control the flu and cold infections.

Peppermint oil: The essential oil of peppermint is used worldwide and it is obtained from the Mentha piperita. This mint hybrid is the most favourite between the essential oil and gardeners. It is the most famous type of essential oil because of its unique applications, and it is mostly used in preventing flu and cold, alleviating headache, relieving pain in muscles and joints, clearing the skin conditions, relieving nausea, and improving the digestive system processes.

Rosemary oil: The essential oil of rosemary is obtained from the evergreen shrub of Rosmarinus officinalis and is famous albeit common kitchen herb has the extraordinary healing potential in its natural oil. Just like the rosemary, the essential oil of this herb has the crisp

woody, herbal, and somewhat balsamic odour just like the camphor. Due to its unique fragrance of rosemary oil, it is used for cleaning the inside and outside of the body. It is further used for the treatment of various diseases, especially skin care, dandruff treatment, to improve the scalp health, to boost up the immune system, flu infections, and ward off cold. Although this oil is used to alleviate the pain, swelling in joints and muscles, for treatment of the digestive tissues, soothe tension headaches, to promote the mental clarity, to enhance the memory, and improve mood, it is also the best natural insecticide and the bug repellent.

Tea tree : The essential oil of the tea tree is obtained from the leaves and stem of Melaleuca alternifolia and shrub of Camellia sinensis. The oil is toxic if ingested directly and it is used mostly for the external purposes and has the herbal, fresh, and slightly camphorates aroma. Melaleuca claims that essential oil of tea tree act as an antimicrobial agent, treating antifungal infections, and cleansing wounds. It is used in cosmetics products including the shampoo to clear some scalp conditions and dandruff and used for the treatment of insect bite to reduce itching and inflammation

Cardamom oil: Elettaria cardamomum, OK for Kids 2+. Common Uses: Indigestion, intestinal cramp, flatulence, dyspepsia, nausea, gastric migraine, constipation, irritable bowel syndrome, colitis, Crohn's disease, muscular cramp and strains, muscular spasm, bronchial congestion, exhaustion and mental fatigue; strengthening, fortifying (from The Complete Book of Essential Oils and Aromatherapy by Valerie Ann Wormwood).

Methods of Producing herbal Oils

Regarding hydrodistillation, the herbal oils industry has developed terminology to distinguish three types: water distillation; water and steam distillation; and direct steam distillation. Originally introduced by Von Rechenberg, these terms have become established in the essential oil industry. All three methods are subject to the same theoretical considerations which deal with distillation of two-phase systems. The differences lie mainly in the methods of handling the material.

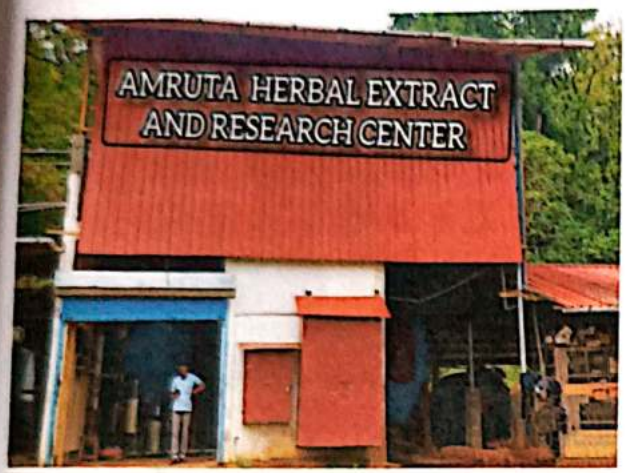
Some volatile oils cannot be distilled without decomposition and thus are usually obtained by expression (lemon oil, orange oil) or by other mechanical means. In certain countries, the general method for obtaining citrus oil involves puncturing the oil glands by rolling the fruit over a trough lined with sharp projections that are long enough to penetrate the epidermis and pierce the oil glands located within outer portion of the peel (ecuelle method). A pressing action on the fruit removes the oil from the glands, and a fine spray of water washes the oil from the mashed peel while the juice is extracted through a central tube that cores the fruit. The resulting oil-water emulsion is separated by centrifugation. A variation of this process is to remove the peel from the fruit before the oil is extracted.

Hydrodistillation

In order to isolate essential oils by hydrodistillation, the aromatic plant material is packed in a still and a sufficient quantity of water is added and brought to a boil; alternatively, live steam is injected into the plant charge. Due to the influence of hot water and steam, the essential oil is freed from the oil glands in the plant tissue. The vapor mixture of water and oil is condensed by indirect cooling with water. From the condenser, distillate flows into a separator, where oil separates automatically from the distillate water.

METHODOLOGY

Study site



The Amruta herbal oil extract and research centre is located near the Kali River at Honalli Bargal village in Devalmakki Grampanchayat Karwar, Uttara Kannada district. This centre is spread across 20 acres. (140 51'17.39" N and 740 16'03.76" E). It was started by Ganesh Navrekar in 2003. This centre also includes plantation of many plant species, including some rare species endangerous and endemic species like Agarwood, etc.

EXTRACTION METHODS OF HERBAL OILS

Herbal oils are used in a wide variety of consumer goods such as detergents, soaps, toilet products, cosmetics, pharmaceuticals, perfumes, confectionery food products, soft drinks, distilled alcoholic beverages (hard drinks) and insecticides. The world production and consumption of essential oils and perfumes are increasing very fast. Production technology is an essential element to improve the overall yield and quality of essential oil. The traditional

technologies pertaining to essential oil processing are of great significance and are still being used in many parts of the globe. Water distillation, water and steam distillation, steam distillation, cohobation, maceration and enfleurage are the most traditional and commonly used methods. Maceration is adaptable when oil yield from distillation is poor. Distillation methods are good for powdered almonds, rose petals and rose blossoms, whereas solvent extraction is suitable for expensive, delicate and thermally unstable materials like jasmine, tuberose, and hyacinth. Water distillation is the most favoured method of production of citronella oil from plant material.

Sources of natural herbal oil

Essential oils are generally derived from one or more plant parts, such as flowers (e.g. rose, jasmine, carnation, clove, mimosa, rosemary, lavander), leaves (e.g. mint, Ocimum spp., lemongrass, jamrosa), leaves and stems (e.g. geranium, patchouli, petitgrain, verbena, cinnamon), bark (e.g. cinnamon, cassia, canella), wood (e.g. cedar, sandal, pine), roots (e.g. angelica, sassafras, vetiver, saussurea, valerian), seeds (e.g fennel, coriander, caraway, dill, nutmeg), fruits (bergamot, orange, lemon, juniper), rhizomes (e.g. ginger, calamus, curcuma, orris) and gums or oleoresin exudations (e.g. balsam of Peru, Myroxylon balsamum, storax, myrrh, benzoin).

Raw materials used for oil extraction:

1. **Patchouli:** Patchouli is a species of flowering plant in the family Lamiaceae, commonly called mint or deadnettle family. The plant grows as bushy perennial herb, with erect stems reaching up to 75cm in height and bearing small, pale, pink-white flowers.

2. Vetiver: Vetiver is a plant. The root is used to make medicine. People take vetiver for nerve and circulation problems and for stomach pain. Some women take vetiver to start their periods.

3. Nagarmotha (cypriol): Nagarmotha is a classical ayurvedic herb of perennial. Nagarmotha is a colonial plant exhibiting fibrous root and usually grows to a height of 7-40cm

4. Cardamom: Cardamom is a herbaceous perennial plant in the ginger family. It is used as spice in food. The seed and oil from the seeds are used for the medicine.

5. Celery: It is a flowering plant in the family apiaceae. Celery seed oil possesses a spicy, warm, long-lasting aroma and also used in cosmetic and soaps. These raw materials used in this centre are purchased form Mumbai.

Mechanism of Distillation Hydrodistillation of plant material involves the following main physicochemical processes: i) Hydrodiffusion ii) Hydrolysis iii) Decomposition by heat.

Hydrodiffusion

Diffusion of essential oils and hot water through plant membranes is known as hydrodiffusion. In steam distillation, the steam does not actually penetrate the dry cell membranes. Therefore, dry plant material can be exhausted with dry steam only when all the volatile oil has been freed from the oil-bearing cells by first thorough comminution of the plant material. But, when the plant material is soaked with water, exchange of vapors within the tissue is based on their permeability while in swollen condition. Membranes of plant cells are almost impermeable to volatile oils. Therefore, in the actual process, at the temperature of boiling water, a part of volatile oil dissolves in the water present within the glands, and this oil-water solution permeates, by osmosis, the swollen membranes and finally reaches the outer surface, where the oil is vaporized by passing steam.

In the perfume industry, most modern essential oil production is accomplished by extraction, using volatile solvents such as petroleum ether and hexane. The chief advantages of extraction over distillation is that uniform temperature (usually 50° C) can be maintained during the process, As a result, extracted oils have a more natural odour that is unmatched by distilled oils, which may have undergone chemical alteration by the high temperature. This feature is of considerable importance to the perfume industry; however, the established distillation method is of lower cost than the extraction process.

Hydrolysis

Hydrolysis in the present context is defined as a chemical reaction between water and certain constituents of essential oils. Esters are constituents of essential oils and, in the presence of water, especially at high temperatures, they tend to react with water to form acids and

alcohols. However, the reactions are not complete in either direction and the relationship between the molal concentrations of various constituents at equilibrium is written as:

$$K = \frac{(\text{alcohol}) \times (\text{acid})}{(\text{ester}) \times (\text{water})}$$

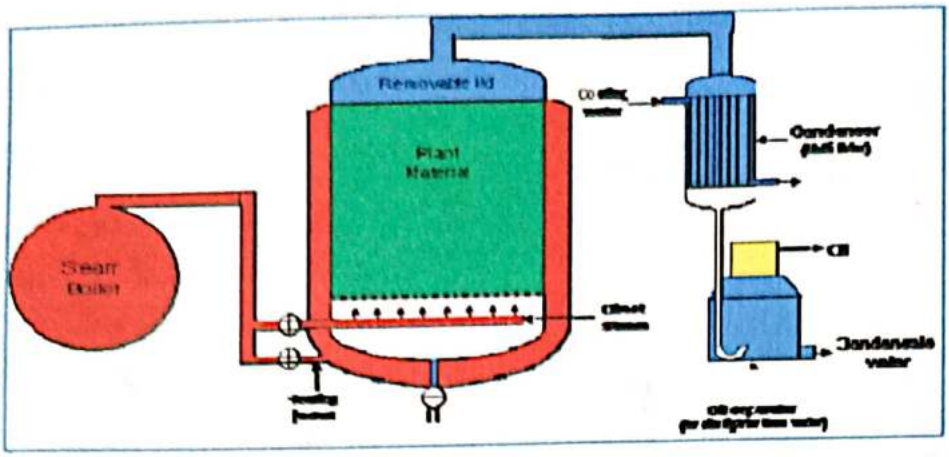
where K is the equilibrium constant.

Therefore, if the amount of water is large, the amounts of alcohol and acid will also be large, resulting in a decreased yield of essential oil. Furthermore, since this is a time-dependent reaction, the extent to which hydrolysis proceeds depends on the time of contact between oil and water. This is one of the disadvantages of water distillation.

Effect of Heat

Almost all constituents of essential oils are unstable at high temperature. To obtain the best quality oil, distillation must be done at low temperatures. The temperature in steam distillation is determined entirely by the operating pressure, whereas in water distillation and in water and steam distillation the operating pressure is usually atmospheric. All the previously described three effects, i.e. hydrodiffusion, hydrolysis and thermal decomposition, occur simultaneously and affect one another. The same is true for the rate and extent of hydrolysis. However, it is possible to obtain better yield and quality of oils by: (1) maintaining the temperature as low as possible, (2) using as little water as possible, in the case of steam distillation, and (3) thoroughly comminuting the plant material and packing it uniformly before distillation

Direct Steam Distillation



As the name suggests, direct steam distillation is the process of distilling plant material with steam generated outside the still in a satellite steam generator generally referred to as a boiler. As in water and steam distillation, the plant material is supported on a perforated grid above the steam inlet. A real advantage of satellite steam generation is that the amount of steam can be readily controlled. Because steam is generated in a satellite boiler, the plant material is heated no higher than 100° C and, consequently, it should not undergo thermal degradation. Steam distillation is the most widely accepted process for the production of essential oils on large scale. Throughout the flavour and fragrance supply business, it is a standard practice. An obvious drawback to steam distillation is the much higher capital expenditure needed to build such a facility. In some situations, such as the large-scale production of low-cost oils (e.g. rosemary, Chinese cedarwood, lemongrass, litsea cubeba, spike lavender, eucalyptus, citronella, cornmint), the world market prices of the oils are barely high enough to justify their production by steam distillation without amortizing the capital expenditure required to build the facility over a period of 10 years or more.

Boiler

It is a closed vessel in which fluid is heated. The heated or vaporized fluid exist the boiler for use in various process. The hardwater is converted into soft-water which is then loaded in the boiler water jacket with aromatic leaves, stem and roots. Which is boiled through wooden fire boiler. As every material has a different pressure the steam is generated based on its quantity. The steam is generated inside the water jacket (steamer). Which is later passed through steam line which is connected to distillation kettle.

2. Distillation kettle

This distillation kettle consists of falls bottom, steam sparger and also it has M.S wall. It consists of stem jacket. Up to10-12 kg steam pressure per scale square is injected. The total volume of this distillation kettle is 8500KL. The steam ruptures the cell-wall and comes out through vertical and horizontal condensation tubes. G-I pipe is for condensation condensed water comes in the receiver. Based on condensed water the number of receiver and placed. It is either heavier or lighter than water clove settles down 40% of the oil floats. Floated oil is scooped.

Advantages of Direct Steam Distillation

- Amount of steam can be readily controlled.
- No thermal decomposition of oil constituents.
- Most widely accepted process for large-scale oil production, superior to the other two processes.

Disadvantage of Direct Steam Distillation

- Much higher capital expenditure needed to establish this activity than for the other two processes.

RESIDUE OF OIL EXTRACTION

1.Cardamom residue_* Used in perfumes.

2.Nagarmotha residue: * Used in perfumes.

3. Celery residue: * Used in seasoning.

4. Vetiver residue: * Used in incense stick.

5. Patchouli residue: * Used in incense stick.

CONCLUSION

There are multiple methods for extracting herbal oils, and the process chosen can greatly affect the amount and quality of the oil produced. Water distillation, water and steam distillation and several are the most traditional and commonly used methods. Some of the major constraints in sustainable industrial exploitation of medicinal and aromatic plants (MAPs) are due to the fact that the countries of South East Asia have poor agricultural practices for MAPs, unscientific and indiscriminate gathering practices from the wild, poor postharvest and post-gathering practices leading to poor quality raw material, lack of research for the development of high-yielding varieties of MAPs, poor propagation methods, inefficient processing techniques, poor quality control procedures, lack of research on process and product development, difficulty in marketing, non-availability of trained personnel, lack of facilities and tools to fabricate equipment locally, and finally lack of access to the latest technologies and market information. This calls for co-operation and coordination among various institutes and organizations of the region, in order to develop MAPs for sustainable commercial exploitation.

The process of extracting MAPs determines how efficiently we add value to MAP bioresources. In the case of essential oils, the extraction process affects the physical as well as internal composition. External appearance, at times, can result in rejection of the batch even if the analytical results are within acceptable limits. Furthermore, essential oils are evaluated internationally for their olfactory properties by experienced perfumers and these olfactory qualities supersede analytical results. Variations in the chemical constituents of the extracts of medicinal plants may result by using non-standardized procedures of extraction. Efforts should be made to produce batches with quality as consistent as possible (within the narrowest possible range).