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"Comparative studies on extraction of natural perfume from some aromatic plants found in Akola"

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Abstract- *Natural perfumes are made from plant materials such as flowers, leaves, stems, wood, roots, seeds and resins from which essential oils, absolutes, floral waxes, vegetable oil and water are extracted. Unlike a synthetic perfume whose list of ingredients is very complex that of natural perfumes is much simpler and ensures the absence of harmful chemical components such as synthetic musks, phthalates or parabens. They are used in a wide range of products, including cosmetics, personal care products, and home fragrances. The production method of the oil depends on the botanical source. Several methods are employed in modern perfumery. The majority of essential oils are obtained by steam distillation or hydro-distillation. Many flowers and plant parts are easily available in nature.The enfleurage method of extracting essential oils is both costly and labor-intensive. For small entrepreneur, it is beneficial to rise their earning.*
The present study relates comparative studies on extraction of natural perfume from some easily available plant parts in Akola.

Key words-Natural perfumes, synthetic perfume, extraction

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I. Introduction

Perfumes can be defined as substances that emit and diffuse a pleasant and fragrant odour. It is a fragrant liquid made from an extract that has been distilled in alcohol and water. It is a complex mixture of aldehydes, ketones, hydrocarbons, alcoholic acid and short chain esters. Since the beginning of recorded history, humans have attempted to mask or enhance their own odour by using perfume, which emulates nature's pleasant smells. Many natural and man-made materials have been used to make perfume to apply to the skin and clothing, to put in cleaners and cosmetics, or to scent the air. Because of differences in body chemistry, temperature, and body odour, no perfume will smell exactly the same on any two people. Perfume comes from the Latin "per" meaning "through" and "fume," or "smoke." Many ancient perfumes were made by extracting natural oils from plants through pressing and steaming. They can be found in leaves, flowers, stems, barks, and roots. The oil was then burned to scent the air. Today, most perfume is used to scent bar soaps. Some products are even perfumed with industrial odorants to mask unpleasant smells or to appear "unscented." While fragrant liquids used for the body are often considered perfume, true perfumes are defined as extracts or essences and contain a percentage of oil distilled in alcohol. (Alhassan, et.al. (2018).

Traditionally perfumes were made from plant and animal substances and prepared in the form of waters, oils, unguents, powders, and incense. This last method of fragrance gives us our word 'perfume' which means 'to smoke through'. 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 odor of the aromatic compounds that are obtained from the raw materials.

Synthetic perfume can remain on the skin for a long time and in the atmosphere for many days or weeks. These poisonous fragrances are known endocrine disruptors. It can cause allergic reactions in certain people, including rashes and skin irritation. Studies conducted on synthetic fragrances have further shown that some of the ingredients in fragrances can be potentially hazardous or even toxic. Phthalates are a common fragrance ingredient that may be cause for concern. Diethyl phthalate, the one used in fragrances, has been linked to hormone disruption and developmental disorders, particularly in newborn males. According to research, 95 percent of chemicals used in synthetic fragrances are derived from crude petroleum oil. They also happen to contain an absurd variety of carcinogenic chemical additives like benzene derivatives, aldehydes, toluene and a myriad of other toxic substances which have links birth defects, allergies, cancer, nervous system disorders and more. Some fragrances can even cause dizziness and headaches. Another issue is that there is no law that pushes companies to disclose the chemicals used in their fragrances.

There is high demand for perfume as well as essential oil which is use in making soap, insecticides, cloths, paper, candle, room freshener, cosmetics, washing powder, sanitary napkin, food, incense stick etc.

Natural perfumes are non-toxic, safe, hypo-allergenic and eco-friendly. Natural fragrances have actions that keep mosquitoes or other critters away. For example, lavender, geranium, mint, eucalyptus, etc. help to keep bugs away. Natural perfumes or essential oils have been used for therapeutic purposes for centuries. Most natural fragrance oils have significant healing properties that are effective in improving the body, mind, and soul.

Akola is a district in vidarbha region in the state of Maharashtra in central India. It is located at latitude 20-7 North longitude 77.07 the east. It is at an altitude of 925 ft (282m) above sea level. It has tropical savannas climate. Annual temperature ranges from high of 480 C (118 f) to a low of 100 C (50 f). Studies were taken into consideration *because* these plants are easily available in nature. Extractions of natural perfume from these plants are almost untouched. There is urgent need for perfume production and from local raw materials in order to supplement the existing ones. For small entrepreneur, it is beneficial to rise their earning.

There should be more research to be carried out on extraction of essential oil and its formulation from vast variety of oil bearing plants in our ecosystem. Our aim is too focused on extraction & application of natural perfume from plants found in Akola.

II. Material And Method

Fresh samples of *Rosa damascene, Polianthus tuberose, Mentha arvensis, Cymbopogon flexuosus, Citrus sinensis, Citrus limon, Jasminum sambac, Santalum album, Ocimum sanctum, Cinnanomum verum, Plumeria rubra* was collected from the various parts of Akola during the month of January to March 2023. More than 12 plants were selected. Selection was done on the basis of their strong scent so that it really comes through when we will make the perfume. The fresh sample of these plants was bought in the laboratory & wash with distilled water to remove the dust present on leaves, peel, petals & stem. These plant parts were later cut into slices.

Perfume extraction method-

Simple traditional homemade perfume-

Apparatus and reagents-

- Beaker/glass jar
- Mortar and pestle
- Muslin cloth/ strainer
- Measuring cylinder
- Weighing pan
- Distilled water
- Ethyl Alcohol
- Essential oil
- Material sample

1. ***Without alcohol-***

15 ml. distilled water were taken in the beaker with 10 grams of plant parts. Plant parts and water stir gently. These samples were poured into a small strainer over a small beaker. All samples were then crush with the mortar and pestle one by one. & put it back in the original beaker and return the water to the beaker. After mixing these steps were repeated again for a stronger scent. Pressing was done to remove all of the moisture out of the samples. Filtration was done by using a very small funnel. Collection of perfume was done by pouring the liquid into the perfume bottle. These perfumes were store in the refrigerator to maintain a stable temperature and keep it away from light and heat to avoid oxidation or chemical degradation.

2. **With alcohol-**

10 grams plant parts were taken into the glass jar and 15 ml. ethyl alcohol was pour over it. Cover these samples to sit it for 24 hours in a cool, dark place. After 24 hours, by using a big cooking spoon it was pulverize and squish. Add the distilled water into the glass jar. Cover the glass jar and leave it to sit in a cool, dark place for four to seven days, taking it out once a day to mix and pulverize the material. After the concoction has been sitting for up to a week, strain the mixture into one or two glass perfume bottles. Shake the perfume before each time spray it, and keep it in the fridge.

3. With essential oils-

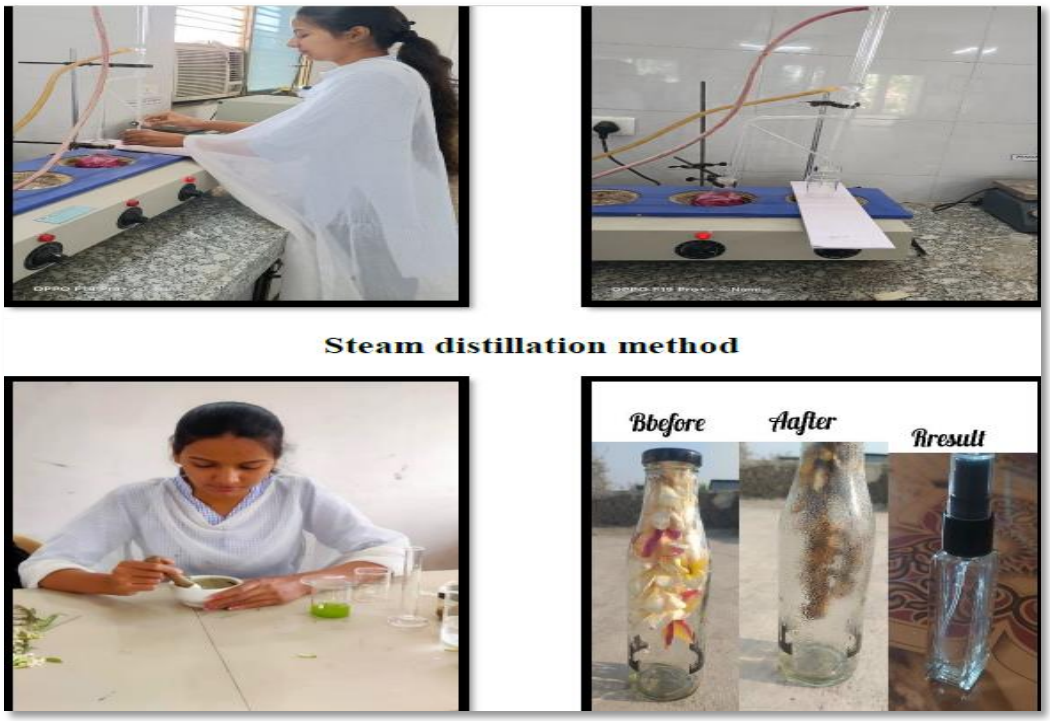
Add 10 to 12 drops of essential oil to collecting bottle & fill the bottle with almond oil. Place the cap on gently.

Steam distillation-

10g of fresh sample were placed into a 250 ml round bottom flask containing 150 ml of distilled water. The flask was fitted with a rubber stopper connected to a condenser and heated. When the water reached 100^{o}C it started boiling ripping off the essential oil from the plant material. When the plant material got heated up, the essential oil that was extracted from the material mixed with the water vapour. Both passed through the condenser and the vapour was condensed into liquid. The condensate was directly collected using a 25ml beaker and then poured into a separating funnel. This formed two layers of oil and water. The tap of the separating funnel was opened to let out the water while the oil was immediately collected into a 100ml stopper. The bottle was closed tightly to prevent vaporization of the essential oil. The oil was collected and the volume of oil obtained was weighed.

A fixative is used to equalize the vapour pressures, and thus the volatilities, of the raw materials in perfume oil, as well as to increase the tenacity.

10ml of sample essential oil extract were measured and placed in a 120 ml beaker containing 2.5ml 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 10ml bottle.



Home-made method

III. Observation And Results

Morphological characters of plants-

1. *Rosa indica* L.

Common name- Rose, Gulab

Family- Rosaceae,

Parts used-Petals

Collected From- Tower chowk, Akola.

Deciduous shrub, stems densely armed with stout, curved prickles and stiff bristles. The leaves are pinnate, with five (rarely seven) leaflets. The roses are a light to moderate pink to light red. The relatively small flowers grow in groups. The bush has an informal shape. Flowers are solitary (single) or in corymbs (cluster). Calyx is five lobed, either simple or compound. Petals & Sepals are generally five. Carpals are many, inserted at the base of the calyx tube and with simple projecting style and stigma.

Uses-

An aromatic fragrance of this flower has a range of health benefits. It is also known for its sedative and anxiolytic properties. They can be used for relaxation, invigoration, and stress relief. It is used in many soaps, candle, lotions and perfumes and can also be applied topically to the skin. Rose oil is also a natural preservative for cosmetic products. The oil has antibacterial and antioxidant properties, and is a great way to keep our skin

looking young and healthy. It is also use to make an aromatic massage. This is a great way to soothe a tense mind and relieve stress. It has antiseptic, anti-inflammatory, and healing qualities.

2. Polyanthus tuberosa. L
Common name-Tuberose, Nishigandh
Family- Amaryllidaceae
Parts used- Petals
Collected from- Adarsh colony & Janata Market, Akola
Herbaceous, growing from underground tubers or tuberous roots; produces offsets. The leaves are a dull green. They are slightly succulent. The inflorescence is a spike, with pure white waxy flowers. The flowers are tubular, long, separating into six flaring segments (tepals) at the end, and are strongly fragrant. There are six stamens, inserted into the tube of the flower, and a three-part stigma.
Uses-
An aromatic fragrance of this flower stimulates parts of the brain. It also provides emotional strength from stress and tension. It has antispasmodic and anti-inflammatory properties. It relaxes the nerves, muscles, and brain. It helps to calm the soul and reduce tension, anxiety, stress, anger, and depression. It is for making numerous incense mixtures and cosmetics.
3. Mentha Spicata.
Common name-Mint, Pudina
Parts used- Leaves
Family- Lamicaeae.
Collected from- Deshmukh peth, Akola.
It is herbaceous rhizomatous perennial plant, with smooth stems. The rhizomes are wide spreading, fleshy, and bear fibrous roots. The leaves dark green with reddish veins, and they have an acute apex and coarsely toothed margins. The flowers are purple, with a four-lobed corolla produced in whorls (verticillasters) around the stem, forming thick, blunt spikes.
Uses-
An aromatic fragrance of this leaves shows anti-bacterial action, wound healing action, anti- fungal action. Problems like headache, muscle aches, joint pain, and itching can be removed. In aromatherapy, oil is promoted for treating coughs and colds, reducing pain, improving mental function, and reducing stress. It is also used in skin-cooling and spiritreviving properties in Colognes, perfumes and cosmetic products.
4. Cymbopogon flexuosus Nees ex Steud.W.Watson
Common name-Lemongrass, Gavati Chaha
Family- Poaceae,
Parts used- Leaves
Collected from- Shivaji College, Akola.
Perennial grass grows in dense clumps and has several stiff stems and slender blade-like leaves which droop towards the tips. The leaves are blue-green in colour, turning red in the fall and emit a strong lemon fragrance when damaged. large compound flowers on spikes.
Uses:-
Lemongrass essential oil extracted from leaves is known to tone and purify the skin and its many applications can include: oils, gels, lotions, soaps, shampoos, sprays, and candle making. Lemongrass is also a popular aromatherapy tool which adds in relieving stress, anxiety and depression. It has antioxidant, antimicrobial properties.
5.Citrus Aurantium.
Common name- Orange, Santra.
Parts used- Peel
Family-Rutaceae
Collected From-Adarsh colony & Janata Market, Akola.
Small, spiny shrubs or trees with alternate, usually evergreen, leaves, which are shiny and leathery and dotted with oil glands; stems are mostly winged and jointed with the leaves and there is usually a spine on the twigs at the attachment of each stem. Flowers smell sweet and they have five petals that are white and some kinds have purple staining in the outer surfaces. The fruits are spherical or egg-shaped and have 8-14 juicy sections containing large, white or greenish seed leaves (cotyledons).
Uses-
Peels have powerful aromatherapy benefits. It has mood-enhancing and stress-reducing properties and aromatherapy activates the limbic system, with a wide range of calming, stress reducing, pain-fighting effects. It promotes the body's natural defenses and detoxification processes. It is used in cosmetics. Orange Oils are known for their cleansing and purifying touch, helping to balance oily skin, and improve the appearance of acne

and blemishes. It is use in diffusions and air fresheners. Ideal for use in natural bug repellent sprays as well as it discourages the presence of insects.

6. Citrus aurantifolia.

Common name- Lemon, Citrus, Limbu

Parts used- Peel

Family- Rutaceae.

Collected from- Shivaji College &Janata Market, Akola.

Small trees heavily armed with numerous axillary spines. Leaflets elliptic to oval, obtuse to refuse and abruptly acuminate apically, broadly cuneate basally, the margins crenulate and somewhat revolute; petioles narrowly margined, but not winged, articulated with the leaflet; Flowers bisexual or male. Petals white, tinged purple. Stamens 20-30; Fruits at maturity ovoid, mammillae apically, light yellow, acid, the peel not easily separating from the segments.

Uses-

Expressed peel Oil is used in perfumes and flavours for its refreshing, sweet-fruity note. It is used to help cure wounds and resolve any kind of sickness. It stimulates the liver and lymph activity, detoxify and energize the body. It enhances our mood, and stimulates the nervous system.

7. Jasminum sambac (L.) Aiton.

Common name – Jasmine, Mograa.

Parts used- Flowers

Family- Oleaceae

Collected from- Shivaji College, Akola.

An evergreen vine or shrub, leaves ovate, opposite or in whorls of three, simple They are smooth (glabrous) except for a few hairs at the venation on the base of the leaf. The flowers bloom all throughout the year and are produced in clusters of 3 to 12 together at the ends of branches. They are strongly scented, with a white corolla. The flowers open at night (usually around 6 to 8 in the evening), and close in the morning, a span of 12 to 20 hours. The fruit is a purple to black berry.

Uses-

Its petal scent is known to help alleviate stress and anxiety, helping the body to unwind. It is widely used in skin care, stress relief, and as an aphrodisiac. It is a common ingredient in massage oils. It is also use in candles and soaps. It is a natural antibacterial agent against several oral microorganisms. It is also used in the treatment of fever, swollen eyes, and bee stings. It has anti-inflammatory properties. It is a great oil to use for bath products, aromatherapy, and scented deodorants.

8. Ocimum sanctum. L.

Common name- Ocimum, Tulasi.

Parts used- Leaves

Family- Lamiaceae.

Collected from- Shivaji College, Akola.

Small annual or short-lived perennial shrub stems hairy and bear simple toothed or entire leaves oppositely along the stem. The fragrant leaves are green or purple, depending on the variety. The small purple or white tubular flowers have green or purple sepals and are borne in terminal spikes. The fruits are nutlets and produce numerous seeds. **Uses-**

Leaf oil used to cure skin diseases. It is also used in flavouring, cosmetics, soap, Pharmaceuticals and perfumery. It has antioxidant, nourishing, mucilaginous and demulcent properties. Traditionally it is used in malarial fevers, gastric disorders and in hepatic infections. Leaf oil is also used in bronchitis, ringworm and other cutaneous diseases and earache. It also acts as a nerve tonic and to sharpen memory. It is also richly endowed with bioavailable antioxidants, vitamins A and C and calcium.

9. Plumeria rubra L & Plumeria alba.

Common name- Champa, Chafa, Champak or Frangipani

Parts used-Petals

Family- Apocynaceae

Collected from- Shivaji College, Akola.

Spreading shrub or small tree, having thick succulent trunk and sausage-like blunt branches covered with a thin grey bark. The branches are somewhat brittle and when broken, ooze a white latex that can be irritating to the skin and mucous membranes. This latex found in the stem of the plants is in fact toxic, but not deadly unless present in large quantities. The large green leaves are arranged alternately and clustered at the end of the branches. The flowers are terminal, profuse and very prominent, they are strongly fragrant, and have five petals. The colours range from the common pink to white with shades of yellow in the centre of the flower. Initially tubular before opening out and only rarely go on to produce seed.20-60 winged seeds are contained in a pod. The fruits are cylindrical pods that are rarely found.

Uses –

The oil is rich in antioxidant and their antimicrobial activities help to improves eyesight. The fragrance is calmative and its soporific qualities help in stress reduction and uplift mood, lower extracts soothes the mind, augments hair growth, and nourishes the skin. It is known to alleviate inflammation, headache, back pain, and tinnitus. While the aphrodisiac nature of this oil relaxes nerves, muscles, and boost libido. It imbued with strong antioxidant and anti-inflammatory traits. Natural astringent traits aids in moisturizing the dry skin making it soft, supple, and glowing. The deep cleansing activity of this oil aids in clearing impurities, dirt from within the skin and unclog pores. It is valuable in fading skin pigmentation and makes the skin blemish-free. The astringent property is valuable in strengthening hair follicles and safeguards the hair from UV damage and keeps the scalp hydrated and averts dandruff.

Observation Table-

Sr. No.	Plants Name	Color	Times on Extraction		
			With Water	With Alcohol	Steam distillation
1	*Rosa Indica.L*	Pink	3 days	1 day	1 hour
2	*Polyanthus tuberosa. L*	colorless	3 days	1 day	1 hour
3	*Mentha Spicata.*	green	1 day	1day	1 hour
4	*Cymbopogon flexuosus Nees ex Steud.W.Watson*	Light green	1 day	1 day	1 hour
5	*Citrus Aurantium.*	orange	2 days	1 day	1 hour
6	*Citrus Aurantifolia.*	colorless	2 days	1 day	1 day
7	*Jasminum sambac Aiton*	colorless	3 days	1 day	1 hour
8	*Ocimum sanctum. L*	Green	1 day	1 day	1 hour
9	*Plumeria rubra L & Plumeria alba.*	colorless	3 days	1 day	1 hour

IV. Discussion

The use of fragrance is ubiquitous and is a global human phenomenon. Over the course of time, countless numbers of flavors and fragrances have found their way into everyday life, notably into foods, beverages and confectionery items; into personal care products (soaps, toothpastes, mouthwashes, deodorants, bath lotions and shampoos), perfumes, and other cosmetics as well as pharmaceutical formulations. Indeed, flavours and aromas are added to make such products more attractive or to mask the taste or smell of less pleasant ones. In recent times, green consumerism and the resurgence of the use of "naturals" have given a fresh impetus to the development of plant-based products, especially in beauty and wellness industries. Fragrances play a particularly important role in increasing the attractiveness of cosmetics. Among natural fragrances, which are complex mixtures of terpenes and other aromatic or aliphatic compounds, produced as secondary metabolites in specialized secretary tissues of aromatic plants are the most popular.

Steam distillation is the most common method for extraction of perfume. But the major drawback of steam distillation as by increasing amount to water, the amount of by-products production is also increased which reduces the yield and increases the processing time & having a higher initial cost for investment in the equipment needed to execute the process successfully. In this method some fragrant compounds denature through high heat.

Water-based perfume is not clouded by an alcohol enhancement, meaning it smells less strongly of perfume and more of the actual scent we are deciding to put on. The scent is far cleaner than one with alcohol. It is easier on the skin. Unlike alcohol, water is a very noninvasive chemical to the human body.

An alcohol-based perfume will give us a stronger and more powerful scent whereas; oil based perfumes will last longer on our skin with a more accurate scent that will unfold like a flower. Alcohol-based perfume will last about 1-3 hours as it quickly evaporates and oil-based will last up to approximately 15 hours.

In *Rosa Indica color* of essential oil ranges from colorless to Dark pink. Time of extraction is less in steam distillation method as compare.

Polyanthus tuberose was colorless in all the extraction method. Perfume smell as heady, spicy, and creamy. Color ranges from green to darker green after the extraction of steam distillation of *Mentha arvensis.* The smell was minty.

In Traditional homemade extraction method *Cymbopogon flexuous* ranges from light green to dark green. It smells as fresh and light with a hint of lemon. Time of extraction of perfume was less in steam distillation method than the other method.

In *Citrus Aurantium* color ranges from light to dark orange from different types of Traditional homemade method to Steam distillation method. Time of extraction is less in steam distillation method as compared with the other method. It smells as heady, floral-animalic note while at the same time; it has a fresh, baby-like, soapy clean scent.

Colorless appearance showed in all steam extraction method of *Citrus limon*. It smells like sweet, sour and aromatic undertones

In Jasminum sambac the color ranges from yellow to dark orange in all Traditional homemade method but it becomes whitish in Steam distillation method. *Jasmine* smells as heady, spicy, slightly sweet and fruity after extraction

In *Ocimum sanctum* the colour ranges from Light green to dark green in various extraction methods. It has a clove-like aroma as well as a fresh, lemony aroma. Time of extraction is less in steam distillation method as compared with others.

Plumeria rubra the smell of perfume is exotic, tropical, heady, 'solar' (sunkissed), lactonic, jasmine and tuberose-like, and sweet; with notes of apricot, peach and hints of lemon. Time of extraction is less in steam distillation method as compared with others. Overall in all the above tables' time of extraction of in steam distillation method is less as compared with other Traditional homemade methods but in steam distillation method some fragrant compounds denature through high heat.

V. Conclusion

The plant organs of various plant species consist different types of secondary metabolite compound. Each plant species is in phytochemical in it.

In the present study various plant parts of different plants are taken into consideration with respect to fragrance it possess. so for we have taken parts of nine plants. When the perfume was extracted by different extraction methods like steam distillation and homemade, the time for extraction, color of perfume is varying as well as smell is also different.

This variation in all above stated plants, physical appearing characteristics of perfume might be due to presence of varied aromatic and volatile chemical compounds.

The further preliminary qualitative and quantitative study of all studied compound is necessary in future.

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PHOTOPLATE-1

Rosa indica L.

Petals of *Rosa indica* L.

Extracted Perfume

Polyanthus tuberosa L.

Petals of *Polyanthus tuberosa* L.

Extracted Perfume

Mentha spicata L.

leaves of *Mentha spicata* L.

Extracted Perfume

PHOTOPLATE-2

Cymbopogon flexuosus (Nees ex. steud) Will.Watson

leaves of *Cymbopogon flexuosus*

Extracted Perfume

Citrus aurantium L.

Peels of *Citrus aurantium* L.

Extracted Perfume

Citrus aurantifolia L.

Peels of *Citrus aurantifolia* L.

Extracted Perfume

PHOTOPLATE-3

Jasminum sambac (L.) Aiton

Flowers of *Jasminum sambac*

Extracted Perfume

Ocimum sanctum L.

Leaves of *Ocimum sanctum* L

Extracted Perfume

Plumeria rubra L.

Flowers of *Plumeria rubra* L

Extracted Perfume