

ESSENTIAL OILS – DOMESTIC MARKET POTENTIAL, DEMAND AND USE ♦.

Sitaram Dixit
Senior Manager – Fragrance Applications
International Flavours & Fragrances India Limited

Four hundred thousand species of plants exist in this universe. Two hundred of them approximately yield essential oils. Essential oils are produced by tiny glands at the petals, leaves, stems, roots, bark and wood of plants and trees. In case of leaves and petals of flowers they are produced in the inner most cell membrane in the parenchymatous tissue and in case of other plant body it is found in the cytoplasm or separate cell centres. Under normal natural conditions, essential oils are released from the plant slowly to the surroundings. When heated or crushed these glands break releasing the plant aroma. Essential literally means the presence of an essence or odour and oil because they leave an oily spot on paper.

Natural essential oils are complex chemical compounds having a small molecular structure and are volatile by nature. They are neither greasy nor fatty and do not leave any oily residue on skin. They are soluble in alcohol, vegetable oils and water. Essential oils are terpenes or hydrocarbons in unsaturated straight chain molecules based on isoprene (C_4H_8) ring structure. Terpenes easily combine with other organic groups and act as a carrier of aromatic substances. Besides being rich in terpenes and oxygenated terpene derivatives, it may also contain alcohols, phenols, aldehydes, ketones besides oxygenated and sulphuretted oils.

Essential oils are extracted from plant parts by use of any of the following procedures

- Pressing / Cold expression.
- Tapping.
- By enfleurage
(Absorption of the fragrant oil in a greasy oil and then separated by solvent extraction)
- Steam distillation.
- Water distillation.
- Hydro diffusion by application of gentle pressure during distillation.
- Alcohol extraction.
- Carbon dioxide extraction.
- Molecular distillation.

Essential oils are natural antioxidants and normally do not get rancid, however they generally react with water and oxygen. Once processed the essential oils are stored closed tight in dark glass bottles in a cool place away from direct heat and light. It is easy to spot the difference between good quality oil and a bad one. When a bottle of oil is kept on the table and the lid opened will give a whiff of its aroma. If one has to move closer to sniff it is poor quality oil.

Dawn to dusk and from womb to the tomb we are enveloped by odiferous substances. Our emotions and behaviour are influenced by smells. However, due to our pre-occupation in our routine we disregard to focus attention on essential oils, we use extensively in our routine. Some important uses where odour plays an important role in our daily lifestyles include, toothpaste, shaving soap, after shave lotions, bathing or toilet soap, laundry soaps and detergents, cosmetic creams, lotions, fine fragrances, incense sticks, pharmaceutical products, medicines, plastic goods, textile fabrics, leather goods, baby food, confectioneries, bakery products, beverages, bottled water, tobacco, pan masala, cold drinks, biscuits, cookies, air fresheners, disinfectants, insecticides, fungicides, floor cleaners, mosquito repellents, etc.

Since prehistoric times, humans have made use of essential oils. The sense of smell helps in identifying which food is suitable for our consumption. Fruits emit a pleasant aroma when ripe and fit for eating. The odour of flowers attracts insects, help in pollination and propagate the plant species. The odour of flowers, fruits are all due to the presence of essential oils proving the vital role they have played in the

evolution down, ages, eras and civilisations. India has the unique distinction in the use of essential oils for producing fragrances from ancient times. The venerated science of perfumery continues to flourish from early times until date. Fragrance usage is a way of life in India. Fragrances are used for religious worship in our homes and in temples. Burning Sambrani Doop and use of sandalwood paste and holy basil is common. Fragrant flowers and leaves strung into garlands are offered to gods, the elderly. Women also decorate their hair with flower garlands as adornments.

The Vedas that are more than 3000 years old mentions the use of different herbs, barks, shrubs, and flowers as Yagna offerings to please god almighty. Turmeric and sandalwood oils were used to perfume human body. Use of fragrance water for bathing and freshening has been described in detail in the Indian Epics, the Ramayana, and the Mahabharata. Herbal extracts containing essential oils in vegetable oil, base both for internal and external use is popular in Ayurveda. Inhalation and sniffing of essential oil is a common form of treatment for various nervous disorders and respiratory ailments. Bathing in water containing essential oils, and herbal extracts are a part of treatment especially for skin care and skin ailments.

The use of herbs in medicine spread from ancient Indian civilisation to other parts of the world. This ancient system of herbal medicinal therapy with modern scientific understanding and experimentation forms the basis of Aromatherapy. Aromatherapy as the name suggests is a holistic therapy using fragrant essential oil to treat body and mind. External application and odour of essential oil re-balance the body systems, helps aid relaxation, assist in healing and alleviate stress. Aromatherapy enables us to benefit from the therapeutic properties of fragrant essential oil and is regarded as an independent alternative therapy with additional cosmetic benefits. Thus it claims to enhance beauty by means of internal harmony and general well being in addition to treating tangible condition through natural based cosmetics that make use of fragrances containing essential oils derived from plants.

Chinese traveller Fa – Hien describes India as a land of exotic aromatic flowers, fruits, resins and grass. He describes the role of *Ghandikas* or perfumers who created the fragrances and marketed it. Sanskrit texts written during the Mauryan rule describes the method of fragrance preparation and its development. Sandalwood is grated on a wet stone and mixed with grounded spices. The paste obtained is crushed along with fragrant flowers and leaves and mixed well with oil. The oil so obtained was used to apply all over the body to keep it pleasant smelling.

Natural essential oils traditionally have been used to make attars or Natural fragrances. Some attars are pure oil while some are mixtures of different essential oils, resins, and concentrates in a natural base or carrier oils. The unique aroma of attar is due to the condensed vapours of individual flowers directly into the base oil generally sandalwood oil. The aroma of sandal wood oil has the unique property to complement with the aroma of other plant oils, combined with it, and acts as a preservative to other essential oils without getting rancid. In olden times, Attars were very popular with the well to do sections of society. Abul Fazal who chronicled the times of Emperor Akbar in his book Ain – e – Akbari details the use of attar, incense and the use of rose attar for bathing.

Essential Oils, flower absolutes, oleoresins, are basic raw materials for Flavour and Fragrance creation and almost all produced are consumed by this industry. The market potential and demand of essential oils therefore is closely related to the Fragrance and Flavour industry which in turn is largely depended on the Food, Pharmaceuticals, and the FMCG Industry.

The application areas for flavours and fragrances are as given below.

Flavours

1. Food Industry: Beverages, Confectionery, Dairy Products, Bakery and Processed Foods,
2. Feed Industry: Pet Food, Farm animal feed, etc.,
3. Tobacco: Cigarette, Gutka, Gudaku, Pan Masala, etc.,
4. Pharmaceutical Industry: Medicines and Health Food Supplements, etc.,
5. Mouth care: Toothpaste, Mouth rinse, Mouth Fresheners, Lipgel, Lipstick, etc.

Fragrances

1. Functional Products
 - Personal Care: Toilet soaps Shampoos, Shower Gel, Cosmetics, Toiletries, Deodorants, etc.
 - Fabric Care: Laundry Soaps, Synthetic Detergents, Fabric Conditioner, etc.,
 - Household Care: Air Fresheners, Candles, Incense sticks, Insect Repellents, etc.,
2. Fine Fragrances
3. Aromatherapy

Flavour Sectors Sales ¹

Product group as % of Rs. 460 crores total value-added product sales

Dental preparations (toothpaste, tooth powder, mouth wash etc.)	15%,
Beverages (soft drinks, juices, sparkling water etc.)	20%,
Confectionery (chocolates, candies, biscuits, jam, jellies, chewing gums, Indian sweets)	25%,
Processed food (meat, poultry, soups, noodles, etc.)	10%,
Snack food (potato wafers, savouries etc.)	5%,
Dairy products (ice cream, yoghurt, and cheese)	10%
Pharmaceuticals	5%,
Others	10%

Value-added food consumption in India in 2005 is predicted at Rs. 2,30,000 crores. The dosage levels in case of flavour amounts to 0.05% w/w maximum of the product. From the above data, we can easily understand the flavour requirement.

The application areas for fragrances are as given below. However, dosage levels in case of fragrance usage is much higher. Typical dosages of Fragrances used in Personal, Fabric and Household Care products are as below.

Sr. No	Product Category	Dosages %	Sr. No	Product Category	Dosages %
1	Soap	0.8 – 1.5	11	Deodorants	0.5 – 1.0
2	Shampoo	0.5 – 1.2	12	Alcoholic Fragrances	
3	Shower gel	0.5 – 1.2	<i>a</i>	After shave Lotion	1.0 – 2.5
4	Hair Oil	0.8 – 1.5	<i>b</i>	Splash Cologne	1.0 – 3.0
5	Hair Cream / Gel	0.5 – 1.0	<i>c</i>	Eau de Cologne	2.0 – 5.0
6	Talcum Powder	0.8 – 1.2	<i>d</i>	Eau de Toilette	3.0 – 8.0
7	Skin Cream / lotions	0.5 – 1.2	<i>e</i>	Eau de Perfume	10.0 – 25.0
8	Detergent Powder	0.1 – 0.4	13	Insect Repellent	0.2 – 0.5
9	Detergent Bars	0.1 – 0.4	14	Surface Cleaners	0.5 – 1.0
10	Fabric Conditioner	0.5 – 1.5	15	Fragranced Candles	1.0 – 10.0

Segmentation of the Indian Cosmetics, Toiletries, Soaps and Detergent Market ²

Sales as % of Rs. 2,300 crores

Soaps & Detergents	30%
Cosmetic & Toiletries	20%
Incense & Joss sticks	10%
Others	40%

¹ & ² Various sources

Distribution of Fragrance Consumption by the Cosmetics and Toiletries Industry ³

Sales as % of Rs. 460 crores			
Hair-care	25%	Hair dye	8%
Skin care	18%	Shaving cream	7%
Decorative	12%	Room freshener	3%
Talcum powder	10%	Others	7%
Perfumes	10%		

The market for cosmetics, toiletries, soaps and detergents is estimated at Rs. 9200 crores at 'end consumer price'. It is estimated to grow in volume at 15% per annum which is much higher than the growth seen by the developed nations. The cosmetic and toiletries business is likely to be one of the fastest growths segment in FMCG category.

God almighty has blessed India with different types of soils and climates that supports growth of a variety of Plants. 18000 native species are found in India of which 1300 species contain Aromas. In spite of its rich natural forest vegetation and a home to many exotic natural plants India cultivates only limited items of commercial value. There is a great scope for commercial cultivation of several Aromatic Crops in India as there is always a demand for new and specific Aroma Chemical in market for development of new & exotic Flavour & Fragrance.

Fragrance oil nowadays contains a blend of about 10 to 100 different chemical ingredients. On these, some may be synthetic and some natural. Fragrance oil demand continues to rise day by day. The growing middle class, better education, higher disposable income, and the ability to afford fragrance products for home care and personal grooming, and an increasing concern for fitness and good living are all responsible for the spurt in demand. Regular use of essential oils, flavours, & fragrances in a product is not a luxury anymore and plays an important role in consumer acceptance. Fragrance that are novel or unique with usage of natural and botanical ingredients of scientifically captured aromas of natural environment, like jungle / mountain freshness are becoming popular.

Although fragrance usage is on an increase, the availability of quality plant oils for fragrance creation is not sufficient to keep pace with the demand generated. Plant cultivation largely depends on climatic conditions. Yields vary, year after year. Availability differs season to season. Unpredictable quality and odour profile is common. Price fluctuation is rampant. Supply and demand is rarely even. Advent of biotechnology and modern farming techniques has to an extent insulated plant cultivation from the vagaries of nature but this is far too less to make a significant difference on the industry dependence on nature.

In spite of these difficulties, the search for natural fragrance ingredients is on. Although synthetics are able to provide good versatility in creation, it also leads to saturation and stagnation of ideas. The fear of synthetics having unwanted side effects or being potential carcinogens without any therapeutic benefits is having its toll on consumers preferring naturals. Further aromatic crop cultivation freshens up the polluted atmosphere and is a renewable resource in the Eco – system. The crops are useful even after the extraction of available essential oil as they can be converted into artificial board for carpentry, used as fodder for animals, or decomposed to get bio – fertilisers. Essential oil bearing crop cultivation and processing is labour intensive generating good employment opportunities.

³ Various Sources

Some typical essential oils / ingredients extracted from plants growing in India, having great potential in the Flavour and Fragrance Industry.

- Ambrette
- Angelica
- Artemisia
- Asafoetida
- Basil Indian
- Bergamot
- Birch sweet
- Cajeput
- Capsicum
- Caraway
- Cardamom
- Cedarwood
- Celery
- Camomile
- Cinnamon
- Citronella
- Clary sage
- Clove bud
- Clove
- Cocoa
- Coriander
- Cuminseed
- Curcuma aromatica
- Curcuma leaf
- Dhavana
- Dill
- Eucalyptus
- Fennel
- Fenugreek
- Garlic
- Geranium
- Ginger grass
- Ginger
- Grapefruit
- Gurjam Balsam
- Jasmine Absolute
- Juniper
- Kewda
- Lemon
- Lemongrass
- Lime
- Liquorice
- Marigold
- Marjoram
- Mentha citrata
- Mint
- Nagarmotha
- Nutmeg
- Nutmeg
- Nutmeg
- Oak moss absolute
- Orange Bitter
- Orange Sweet
- Palmrosa
- Patchouli
- Pepper
- Peppermint
- Rose
- Rosemary Indian
- Sandalwood
- Spearmint
- Tuberose
- Tulsi
- Turmeric
- Valerian
- Vetiver

In recent years, the world demand for plant based raw materials for manufacturing of Food Flavours, Fragrances, Perfumes, Cosmetics, & Related Products has only grown. World Trade now demands globalisation of market and open economy providing unlimited export opportunities to Indian entrepreneurs.

India is projected to be one of the World's Largest Economies, in terms of GDP, and purchasing power parity. Today we are ranking fifth in the world. The Indian population in this millennium will be extremely young, with 70% under 34 years of age unlike in the developed countries. With a population of over one billion, it is obvious that, **INDIA IS THE LAND OF OPPORTUNITIES.**

-
- ◆ This paper is based on the presentation given by Sitaram Dixit during the "National Convention on Essential Oils and Allied Industries for SME's" held in Mumbai on 1-2 October 2004. organised by SISI, Ministry of Industries, Government of India.
 - ◆ The above paper was published in Indian Perfumer 48 (4): 457 – 462 October – November 2004 published by Essential Oil Association of India.
 - ◆ The paper was reprinted in Soaps, Detergents & Toiletries Review, April 2005 published by Wadhwa Publications.