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Cultivation of aromatic plants –A boon for farmers & entrepreneurs in Maharashtra

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ABSTRACT

Maharashtra State has varying soil types and agro-climatic conditions, which offers tremendous scope for cultivation of Aromatic plants. The regions like, Western Ghats, Konkan, Satpuda hills, Sahyadri ranges, Melghat etc, are the hotspots of Aromatic plants. There is an ever increasing demand of natural -food, pharmaceutical, perfumery, flavours and cosmetic products based on aromatic plants[18-19]. In view of the present status of aromatic plants used in various industries, there is a need to pay attention on the cultivation and conservation of aromatic plants which are extensively used by the industries. Currently, the demand for these plants and their derivatives has increased because they are natural, eco-friendly and generally recognized as safe products[17]. The present research paper aims in creating awareness amongst farmers, entrepreneurs, industrialists and educated youth of Maharashtra regarding the potential of aromatic plants and trade of products obtained from them as a source of economic upliftment/employment.

Keywords: aromatic plants, essential oils, medicines, cosmetics, economic boost.

INTRODUCTION

Maharashtra has been considered as a treasure house of valuable aromatic plant species. Aromatic plants include a large group of economically important plants that provide basic raw materials for medicines, perfumes, flavors and cosmetics. These plants and their products not only serve as valuable source of income for farmers and entrepreneurs but also earn valuable foreign exchange by way of export. It is therefore necessary to collect, conserve and evaluate aromatic plants to develop agro technologies with potential for farming. Wide variation in the soil and climatic conditions in Maharashtra offers great potential for cultivation and marketing of these plants in Maharashtra, India and outside India at international level[3].

IMPORTANCE AND SCOPE :

Aromatic plants possess odorous volatile substances which occur as essential oil, gum exudate, balsam and oleoresin in one or more parts, namely, root, wood, bark, stem, foliage, flower seed and fruit. The characteristic aroma is due to a variety of complex chemical compounds. The term essential oil is similar to fragrance or perfumes because these fragrances are oily in nature and they represent the essence or the active constituents of the plants. Essential oils and aroma chemicals constitute a major group of industrial products. They are adjuncts of cosmetics, soaps,

pharmaceuticals, perfumery, confectionery, ice-creams, aerated waters, disinfectants, tobacco products, incense sticks and a host of related products[1-2].

Maharashtra state is one of the leading supplier of Aromatic plants and allied products to other states & to the industrialized countries of the West, where demand for natural drugs/herbal products has been on the increase in recent years. The cultivation of Aromatic plants has now become an important area in the international agribusiness with an estimated growth rate of 15-18 % and thus the aromatic plants being a natural source of raw material for industrial products offers great scope to achieve higher net returns with the upliftment of rural economy.[20]

There are near about 1100 Aromatic products manufacturing industries in Maharashtra which are dependent on natural forests in Maharashtra and adjoining states for supply of plant parts for manufacturing their medicines / various related aromatic products. The trade of aromatic plant products worth hundreds of crores gives employment to thousands of persons. The rural persons are engaged in the collection of Aromatic plants & allied products from dense forests as well as from domestic cultivation. Traders purchase these products & supply them to wholesalers & Industrial units. Industries give employment to labourers who are primarily engaged in processing and packing. The processed products are Transported and marketed all over Maharashtra, India & internationally. [43]

GOVERNMENT EFFORTS FOR CULTIVATION OF AROMATIC PLANTS.

Realizing the vast untapped potential of Aromatic Plants, the Government of India launched a scheme for their development during the Successive Five-Year Plans. These programmes are being operated in 16 State Agricultural Universities and 3 Regional Research Laboratories of Council of Scientific and Industrial (CSIR). It included production of quality planting material, establishment of herbal gardens, evolving agro-techniques for propagation and production of new plant varieties., as well as setup of regional analytical laboratories[21].

The central as well as state governments provide a variety of financial assistance in the form of loans and subsidies to the farmers engaged in Aromatic Plants cultivation. Through their agencies like AYUSH(ayurveda,yoga, unani, siddha & homeopathy) CIMAP, (central institute of medicinal & aromatic plants) National Medicinal Plant Board (NMPB), Agri-Export Zone, National Bank for Agricultural and Rural Development (NABARD), Agricultural and Processed Food Products Export Development authority(APEEDA),National HorticultureBoard(NHB),State aromatic plantsboard,etc,the state as well as central government is promoting the cultivation of aromatic plants[9].

WHY SHOULD FARMERS CULTIVATE AROMATIC PLANTS IN MAHARASHTRA / ADVANTAGES / SIGNIFICANCE OF AROMATIC PLANT CULTIVATION.- [8- 9- 10- 1]

- [1] Preserving the traditional knowledge- by cultivation of aromatic plants by successive generations.
- [2] Environmental Perspective—Increasing demand for Natural plant products globally.
- [3] Nature conservation- by people awareness & participation .
- [4] Potential of Equitable Commercialization –benefit of farmers, traders, industrialists.
- [5] Trade and Enterprise Development –Opportunities for rural youth.
- [6] Higher returns than traditional crops- Cultivation of Aromatic Plants gives highest net returns .
- [7] Fetch better prices in the market- The value addition due to oil production enhance the profitability of cultivation
- [8] Can be raised as intercrops- along with traditional crops due to ease of their incorporation in the existing cropping systems.
- [9] Can be stored for a long time-The various chemicals present in the essential oils of Aromatic Plants have antimicrobial therapeutic properties & hence have Low chances of pest attacks and diseases.
- [10] Require less water for cultivation- Aromatic plants have devised mechanisms to survive under low water conditions by tolerance ,avoidance or escape to drought conditions.

MAJOR AROMATIC PLANTS THAT CAN BE CULTIVATED IN MAHARASHTRA

| Sr no | Local Name | Uses/economic potential |
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| 1 | Common Name - Musk-dana, Latakasturi, Kast -urbhed. Botanical Name- <i>Abelmoschus moschatus</i> (L.) Medic. Family –Malvaceae. | Seeds are used commercially both in medicine as well as in perfumery. Seeds contain 19.5 % oils like trans-2 –trans- b-farnesyl acetain,ambrettolide,forneol etc. Seeds are musk scented and are used to flavour food & as a substitute of musk. It is aphrodisiac,beneficial for eyes,relieves thirst & used to treat intestinal problems,stomatitis,heart diseases & as mouth freshner.In Unani,it is also used to treat dyspepsia, urinary discharges,gonorrhoea,leucoderma & itching[46]. |
| 2 | Common Name – Lemongrass, Gavati Chaha. Botanical Name- <i>Cymbopogon flexuosus</i> Nees ex Steud.W. Watson Family – poaceae. | Lemongrass oil is popularly known as <i>Cochin oil</i> in the world trade as 90% of it is coming from Cochin port.Lemongrass oil is one of the most important essential Oils being widely used for the isolation of citral which can be converted into ionones having the odour of violets.They are used in flavours, cosm-etics, medicinal industry and perfumes. β -ionone is used for the commercial synthesis of vitamin A. The oil is used as a repellent against flies and mosquitoes.The leaves are used for flavouring foods,drinks,tea & for Scenting Bathwater. [29-46] |
| 3 | Common Name -Palmarosa or Rosh grass . Botanical Name- <i>Cymbopogon martini</i> (Roxb.) J.F. Watson . Family – poaceae. | Distillation of herbs with the flowering parts yields scented oil which is rich in geraniol. Geraniol is highly valued as a perfume and as a starting material for a number of synthetic aroma chemicals like geranyl Esters which have a permanent rose-like odour.The oil has high demand in perfumery,soap, cosmetics and tobacco products blending indus-tries. It has a special importance in soap industry by virtue of geraniol, being stable to alkali[29-46]. |
| 4 | Common Name –Geranium,Rose geranium. Botanical Name- <i>Pelargonium graveolens</i> . L'Hér. Family –Pelargoniaceae. | Geranium oil contains 60-70 % alcohols like,citronellol, geraniol;20-30% esters like, geranyl tiglate,geranyl acetate, citronellyl acetate and the rest aldehydes and ketones.These find extensive use in soap, perfumery, cosmetic & flavouring industries through out the world. Citronellol is used in many perfumery blends of the soap and cosmetic industries. Hydroxy citronellol is a key ingredient in compounding and in floralizing perfume materials.The oil is also used in the manufacture of deodorants,mosquito repellent creams and allied products[36]. |
| 5 | Common Name –Patchouli, pach. Botanical Name- <i>Pogostemon patchouli</i> (Blanco) Benth; Family -Lamiaceae | The essential oil is one of the best fixatives for heavy perfu-mes which imparts strength, character, alluring and lasting qualities. In fact, it is a perfume by itself and is highly valued in perfumes, soaps,Cosmetics and flavour industries. The oil is extensively used as a flavour ingredient in major food products,including alcoholic and nonalcoholic beverages,frozen dairy desserts,candy & packed foods.It blends well with the oils of sandal wood,geranium,Vetiver,cedarwood,clove,lavender,orange and many others. The oil gives one of the finest attars when blended with sandal wood oil[34]. |
| 6 | CommonName-Mint, <i>Pudina</i> . BotanicalName- <i>Mentha arvensis</i> L. Family-Lamiaceae. | Mint has high percentage of menthol , which is widely used for flavouring toothpastes, candies, beverages,Confectionery, chewing gums,pan parag, and mouth washes and for scenting shaving creams, tobacco, cigarettes, aerosols, polishes, hair lotions& lipsticks. It is employed as a soothing ingredient in cosmetics,colognes,deodorants,after shave lotions & perfume bases. It is also used in preparation of ointments, pain balms,cough syrups,cough lozenges and tablets[21-37]. |
| 7 | CommonName-Rose,Gulab. BotanicalName-- <i>Rosa damascena</i> .mill L. Family-Rosaceae. | Rose petals are used in making rose oil that is steam distilled by crushing.Rosewater is an excellent relaxing agent, soothes the nerves and adds flavor to a variety of dishes across the world.Rose essence is rich in flavanoids, tannins, antioxidants, and vitamins A, B3, C, D and E, making it beneficial in skin care.Rose water is highly effective & has multiple uses & multiple health benefits.Different products obtained are rose attar, Gulkand, Gul-roghan Pankhuri and Otto rose[35]. |
| 8 | CommonName-Jasmine Mograa. BotanicalName- <i>Jasminumsambac</i> . (L.) Aiton. Family-Oleaceae . | The scented flowers are used for making perfumes, incense, flavoured Jasmine tea & herbal/black tea.Its oil is also used in creams, shampoos and soaps. It is considered to be a great skin toner and conditioner.Jasmine flowers are stringed together to make garlands.Women wear this flower in their hair.The essential oils obtained from the flowers are used in perfumery and are export oriented [34]. |
| 9 | Common Name- Tuberose,Nishigandh. Botanical Name- <i>Polianthus tuberosa</i> . L. Family-Amaryllidaceae. | The fresh flowers yield about 0.08 to 0.11 percent essential oil.The health benefits of Tuberose Essential Oil can be attributed to its properties as an aphro-disiac, deodorant,relaxing, sedative, and warming substance.it is very popular & priced among perfume manufacturers.Its flower has a beautiful frag-rance, which is active at night, which is the only time that this flower blooms. Due to this, tuberose is popularly known as "Ratra-Raani".The flowers are also used for the making garlands, bouquets and decorations[36]. |
| 10 | CommonName-Vetiver, Vala. Khus. BotanicalName- <i>Vetiveria zizanioides</i> (L.) Roberty Family-Poaceae. | The fragrant essential oil obtained from plant root contains vetiverol and vetiverone & is quite famous throughout the world. It is used in perfumes,for its fixative properties.The mats made from khus plant are hung in the house, to cool rooms during summer. Moreover,they even add a pleasant aroma in the house, when sprinkled with water occasionally. The herb is tied in muslin cloth and added to the earthen pots filled with water, to lend its distinctive flavor and aroma to it.. It is medicinal & used against flatulence & colic pains. [45] |
| 11 | Common Name- <i>Citronella</i> , gavati chaha. Botanical Name <i>Cymbopogon winterianus</i> . Jowitt and C. nardus (L.) Rendle. | Citronella essential oil is obtained by steam distillation of partially wilted leaves. It is used in aromatherapy as a mas-sage oil, it may relieve pain in individuals suffering from arth-ritis.It is widely used in fragrances and personal care prod-ucts.It is largely imported by Germany and France, two of the largest hubs for the perfume Industry.citronella can help treat and prevent colds,fevers & headaches.Because of its anti-septic properties, citronella oil is also used in soaps, house-hold cleaners, and detergents.It is also added as a food & beverage flavoring,such as in alcoholic drinks,frozen dairy, gelatin and puddings[32]. |

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| | Family-Poaceae. | |
| 12 | CommonName-Lavender, Dharu. <i>BotanicalName-Lavandula angustifolia.</i> Mill. Family-Lamiaceae. | The flowers & leaves are used as an herbal medicine, either in the form of lavender oil or as an herbal tea. Products for home use, such as lotions, eye pillows (including lavender flowers or the essential oil itself) and bath oils, etc., are also used. Both the petals & the oil are the most popular ingredients in handmade soap. Major components of the essential oil are linalool and linalyl acetate. The essential oil is antiseptic and antispasmodic. The flowers are also used as a culinary herb. Lavender essential oil, along with a carrier oil, is commonly used as relaxant in body massage[35]. |
| 13 | CommonName-Ocimum, Tulasi. <i>BotanicalName-Ocimum sanctum.</i> L. Family-Lamiaceae. | Different parts have been recommended for the treatment of bronchitis, bronchial asthma, malaria, diarrhea, dysentery, skin diseases, arthritis, painful eye diseases, chronic fever, insect bite etc. It has also been suggested to possess antifertility, anticancer, antidiabetic, antifungal, antimicrobial, hepatoprotective, cardioprotective, antiemetic, antispasmodic, analgesic, adaptogenic and diaphoretic actions. Eugenol, the active constituent present, is largely responsible for the therapeutic potentials of Tulsi[32]. |
| 14 | Common Name-Rosemary. <i>Botanical Name-Rosmarinus officinalis.</i> L. Family-Lamiaceae. | The most important constituents of rosemary are caffeic acid and its derivatives such as rosmarinic acid. Rosmarinic acid is antiviral, antibacterial, anti-inflammatory & antioxidant. The herb is used for flavoring food, in beverages, as well as in cosmetics. Rosemary oil is also an important ingredient used in aromatherapy. Rosemary oil is used for making perfumes or to emit an aroma into a room. It is also burnt as incense, & used in shampoos & cleaning products. |
| 15 | Common Name-Clary sage, Bahman safed [Unani] <i>Botanical Name-Salvia sclera.</i> L. <i>Family-Lamiaceae.</i> | Clary sage oil is ideal to use on a regular basis in baths or perfumes to revitalize & rejuvenate the body & mind. It is used in beer and wine to heighten the effects of the alcohol. The essential oil is used to treat depressive states and is used as a sedative in nervous, anxious states of mind. Massage with clary sage oil is profoundly relaxing with a sensual quality making it beneficial for frigidity partly due to its hormonal aphrodisiac influence. |
| 16 | Common Name- Celery, Bodiajamoda. <i>Botanical Name-Apium graveolens.</i> L. <i>Family-Apiaceae.</i> | Seeds are used for distilling oil & it is useful in toning the nervous system, relieving cellulite & water retention. The essential oil of celery cleanses & purifies the kidneys, liver & spleen. It helps to reduce uric acid in the joints of arthritis, rheumatic & gout patients. The puffiness of the skin is reduced with the usage of celery essential oil. In Ayurveda it is used as a nerve tonic, to relieve bronchitis & asthma. It reduces blood pressure, relieves indigestion, stimulates the uterus, acts as anti-inflammatory, diuretic & aphrodisiac. |
| 17 | Common Name- Coriander, Dhane, Kothimbir. <i>Botanical Name- Coriandrum sativum.</i> L. <i>Family-Apiaceae.</i> | The characteristic aromatic flavor of coriander seeds comes from their essential volatile oils & fatty acids. The seeds contain essential oils such as linalool (68%), pinene (10%), geraniol, camphene, terpine etc. These active principles have great importance in treating disorders like diabetes, increased cholesterol, arteries blockage leading to high blood pressure, ulcers, urinary tract problems, anti anxiety, anti-bacterial and anemia prevention, skin problems, swelling prevention, anti-osteoporosis, liver diseases etc[45]. |
| 18 | Common Name-Cumin, Jeera. <i>Botanical Name- Cuminum cyminum.</i> L. <i>Family-Apiaceae.</i> | Cumin seed is used as a spice & is globally popular for its distinctive flavour & aroma & is used in many cuisines. In Sanskrit, cumin is known as <i>jira</i> "that which helps digestion". These seeds are powdered & used in different forms like <i>kashaya</i> (decoction), <i>arishta</i> (fermented decoction), <i>vati</i> (tablet/pills), and processed with <i>ghee</i> . Cuminaldehyde, cymene and terpenoids are the major volatile components of cumin. Cumin can be used as an anti-oxidant. The antioxidative potential is correlated with the phenol content of cumin. Cuminaldehyde has also antimicrobial and antifungal properties [25]. |
| 19 | CommonName-Fennel, Badishep. <i>Botanical Name- Foeniculum vulgare.</i> Mill. Family-Umbelliferae. | The fennel herb is highly aromatic with a variety of culinary & medicinal uses. Fennel gets its aromatic flavour from anethole, an aromatic compound. Sweet fennel oil is often used in aromatherapy and provides a relaxing soothing effect on the body. Medicinally, Fennel oil from the seeds is used for constipation, Nausea vomiting, as a diuretic & to relieve muscle cramps. Roasted seeds are usually used as a breath-freshener[25]. |
| 20 | Common Name-Ajowan, Owa. <i>Botanical-name- Trachyspermum ammi.</i> Sprague. Family- Apiaceae. | The high concentration of essential oils in ajwain seeds, primarily thymol and other constituents give them an aroma and flavor. Seeds are used as a spice, preservative, digestive aid & to enhance the immune system. The fruits (seeds) are used to flavor curries, pickles, biscuits, confections, beverages. The oil is used in soaps and perfumes, as an antiseptic to treat nasal catarrh & as an antifungal for skin diseases. It is used as mouthwash, gargle or toothpaste preparation. Various products made are solutions, ointments, lotions, powders, and deodorants[25]. |
| 21 | Common Name- Davana, <i>Botanical Name- Artemisia pallens.</i> Wall. Family- Asteraceae. | An important annual aromatic herb, much prized in India for its delicate fragrance. The Davana springs are commonly used in garlands, bouquets and religious offerings in most part of the country. The leaves and flowers contain the essential oil valued for its exquisite and delicate aroma and is used in high grade perfumes and cosmetics. The oil of Davana contains hydrocarbons (20%), esters (65%) and oxygenated compounds (15%). |
| 22 | Common Name- Chamomile, Rasna. <i>Botanical Name- Chamomilla recutita.</i> (L.) Rauschert | The dried flowers of chamomile contain many terpenoids and flavonoids contributing to its medicinal properties. Chamomile preparations are commonly used for many human ailments such as hay fever, inflammation, muscle spasms, menstrual disorders, insomnia, ulcers, wounds, gastrointestinal disorders, rheumatic pain, and hemorrhoids. Essential oils of chamomile |

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| | Family- <i>Asteraceae</i> . | are used extensively in cosmetics and aromatherapy. |
| 23 | Common Name- Geranium, Botanical Name- <i>Pelargonium</i> species. L'Hér. Family –Geraniaceae. | An important high value perennial, aromatic shrub Essential oil obtained by distillation of aerial parts (fresh flowers, leaf and stalks) is extensively used in perfumery and cosmetic Industries. It is employed as a flavouring agent in many major food categories alcoholic and soft drinks. The oil has anti-bacterial and insecticidal properties and substantial use in aromatherapy. |
| 24 | Common Name- Elaichi Cardamom, Veldode. Botanical- Name- <i>Elettaria cardamom</i> , (L.) Maton Family -Zingiberaceae.. | This exotic spice contains many chemical compounds that are known to have been anti-oxidant, disease preventing and health promoting properties.It is Used as antiseptic, anti-spasmodic, carminative, digestive, diuretic, expectorant, stimulant, stomachic and tonic.Seeds are Used to flavour many foods like tea, sweets, biryanis, curries, biscuits etc. [25] |
| 25 | Common Name- Ginger,Ale,Adrak. Botanical-Name- <i>Zingiber officinale</i> Roscoe. Family- Zingiberaceae. | ● Constituents: volatile oil, (mainly zingiberone , bisabolene), oleoresin (gingerols, shogaols and zingerone), fats, protein, starch, vitamins a and b, minerals, amino acids.This plant is called as mahaushadhi in ayurveda.It is Analgesic, Bitter, Anodyne , AntiCancer,Aphrodisiac,Astringent, Muscle Relax-ant, antifatulent & carminative. Ginger is added in vege-table preparations, breads, cookies, puddings, cakes, pickles and soups.The oil is a used in perfumery. |
| 26 | Common Name- kacholam,Kachri. Botanical-Name- <i>Kaempferia galanga</i> . L. Family -Zingiberaceae. | The dried or fresh rhizomes are very aromatic & are used as spice in Indian cuisine.The rhizomes of the plant, which contain essential oils, have been used in medicines as a decoction or powder for treating indigestion, colds, pectoral and abdominal pains, headache, and toothache. |
| 27 | Common Name- Sandalwood,Chandan. Botanical-Name- <i>Santalum album</i> .L. Family -Santalaceae. | Sandalwood oil has a distinctive soft, warm, smooth, creamy, scent. It imparts a long-lasting, woody base to perfumes. The smell of Sandalwood oil is very quite fragrant, relaxing & also helps to clear up dry cough & boosts the digestive system. It is widely used in the cosmetics, perfumery and soap industry. Sandalwood paste is integral to rituals and ceremonies, to mark religious utensils, and to decorate the icons of the deities. It is also distributed to devotees, who apply it to their foreheads or the necks and chests. |
| 28 | Common Name- Eucalyptus,Nilgiri. Botanical-Name- <i>Eucalyptus globulus</i> . Labill. Family-Myrtaceae. | Eucalyptus oil is readily steam distilled from the leaves and can be used for cleaning and as an industrial solvent, as an antiseptic, for deodorising, & in very small quantities in food supplements, especially sweets, cough drops, toothpaste and decongestants. It has insect repellent properties , and is an active ingredient in some commercial mosquito repellents <i>Eucalyptus globulus</i> is the principal source of eucalyptus oil worldwide. Eucalyptus oil is used in soaps, detergents, lotions and perfumes. |
| 29 | Common Name- Clove, Lavang. Botanical-Name- <i>Syzygium aromaticum</i> . (L.) Merrill & Perry Family-Myrtaceae. | Cloves are used in Ayurvedic medicine,where the essential oil is used as an anodyne (painkiller) for dental emergencies. clove oil is used in preparation of some toothpastes and Clovacaine solution, which is a local anesthetic used in oral ulceration and inflammation. Eugenol (or clove oil generally) is mixed with zinc oxide to form a temporary tooth cavity filling.Cloves are used as a carminative, to increase hydrochloric acid in the stomach and to improve peristalsis. Cloves are also said to be a natural anthelmintic. The essential oil is used in aromatherapy when stimulation and warming are needed, especially for digestive problems. |
| 30 | Common Name- Camphor,Kaapur. Botanical-Name- <i>Cinnamomum camphora</i> . (L.) J.Presl. Family-Lauraceae. | Camphor is believed to be toxic to insects and is used as a cockroach repellent, as an antimicrobial & is used to make mothballs. It is kept in clothes used on special occasions and festivals. As Camphor is readily absorbed through the skin producing either a coolness or warmth sensation,it acts as slight local anesthetic.Camphor is an active ingredient (along with menthol) in vapor-steam products,such as Vicks Vapo-Rub. It is used as a cough suppressant & decongestant. Camphor may also be administered orally in small quantities (50 mg) for minor heart symptoms and fatigue. |
| 31 | Common Name- Cinnamon, <i>Dalchini</i> . Botanical-Name- <i>Cinnamomum verum</i> . J.Presl. Family-Lauraceae. | The flavour of cinnamon is due to an aromatic essential oil that makes up 0.5 to 1% of its composition.The pungent taste & scent come from cinnamaldehyde or cinnamylaldehyde. Cinnamon bark is used as a spice. It is principally employed in cookery as a condiment & flavouring material. Cinnamon is a popular flavoring in numerous alcoholic beverages.Cinnamon & cardamom flavoured tea , is consumed as a hot beverage in maharashtra & India. It also has a variety of health benefits[44]. |
| 32 | Common Name- Nutmeg,Jayphal. Botanical-Name- <i>Myristica fragrans</i> . Houtt. Family-Myristicaceae. | The essential oil obtained by steam distillation of ground nutmeg is used widely in the perfumery and pharmaceutical Industries, in toothpaste, and as a major ingredient in some cough syrups.In traditional medicine, nutmeg and nutmeg oil are used for disorders related to the nervous and digestive systems. In our cuisine it is used in many sweet, as well as savoury dishes . It is used in small quantities as a medicine for infants & in <i>garam masala</i> . Ground nutmeg is also smoked in maharashtra & India[44]. |
| 33 | Common Name-Marigold,Zendu. Botanical Name- <i>Tagetes erecta</i> . L. Family-Asteraceae. | Bright yellow and orange Marigold flowers are used to make garlands.They are even used to decorate the religious places. The leaves of its flowers are used as salads. Yellow dye has also been extracted from the flower, by boiling. Pigments in the Marigold are sometimes extracted & used as the food colouring for humans and livestock. Ayurveda states that the essential oil have antispasmodic,vulnerating, hypotensive, tranquilizing, anti-inflammatory and antiseptic properties-. |
| 34 | Common Name - Champaca,Chafa. | The flowers are used in for several purposes. Especially they are primarily used for worship at temples whether at home or out, and more generally worn in hair by girls and women as a means of beauty ornament as well as a natural |

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| | <p>Botanical Name -<i>Magnolia champaca</i>. (L.) Baill. ex Pierre</p> <p>Family-Magnoliaceae.</p> | <p>perfume. Flowers are used to be floated in bowls of water to scent the room, as a fragrant decoration for bridal beds, and for garlands. The essential oil is used to make many world famous perfumes & is used as a massage oils.</p> |
| 35 | <p>Common Name -Henna,Mehandi.</p> <p>Botanical Name -<i>Lawsonia inermis</i>. L.</p> <p>Family-Lytharaceae</p> | <p>Henna powder is made into paste & used to decorate feet and hands of brides , grooms to make temporary designs & tattoos.. In Maharashtra,India and many other countries deco-rating henna has become very popular women's businesse. Henna is used in medications to make skin care products as it has healing properties.It is used for hair as a natural conditioner & colorant & natural hair dye.Its Essential oil is widely used for aromatherapy as a relaxant as well as a room freshner[38].</p> |
| 36 | <p>Common Name-Curry leaf,Kadipatta,</p> <p>Botanical Name-<i>Murraya koenigii</i> . (L.) Sprengel.</p> <p>Family-Rutaceae.</p> | <p>The leaves are highly valued as seasoning in Indian cooking, especially in curries, usually fried along with the chopped onion in the first stage of preparation. Due to its aromatic characteristic properties it is used in soap making ingredi-ents, body lotions, diffusers, potpourri, scent, air fresheners, body fragrance, per-fume, bath and massage oils, aroma therapy,towel sce-ning,spas and health clinics, incense, acial steams, hair treatments etc.. The leaves of <i>Murraya koenigii</i> are believed to possess antidiabetic Properties[44].</p> |
| 37 | <p>Common Name-VANILLA</p> <p>Botanical Name-<i>Vanilla planifolia</i> . Jacks. ex Andrews</p> <p>Family-<i>Orchidaceae</i></p> | <p>Vanilla is one of the most popular flavours in the world. Vanilla beans and derivatives are important in food flavoring, Confectionery,ice-creams,liquors and baked goods. Vanilla flavoured ice-creams,custards,milk shakes, cakes, puddings, chocolates, beverages are very popular in the market. It is also among the Most important ingredients in perfumery. Vanilla is used medicinally as an aphrodisiac, as a stimulant, and to relieve fevers and gastric complaints, vanillin, the main flavour molecule in vanilla, has antimicrobial and anti-oxidant activities[40].</p> |
| 38 | <p>Common Name-Saffron,Keshar</p> <p>Botanical Name-<i>Crocus sativus</i>.L.</p> <p>Family-<i>Iridaceae</i>,</p> | <p>Saffron has a distinct flavor that comes from chemical comp -ounds in it such as picrocrocin,safranal & a natural carote -noid chemical compound,crocin,which gives golden -yellow colour. From antiquity to modern times saffron is used in food, drink, and traditional medicine: It is also used in baking, curries, and liquor making. It is also used as antiseptic, anti -depressant,antioxidant,digestive,anticonvulsant, aphorid-isiac,to treat stomach upsets, bubonic plague, and smallpox.</p> |
| 39 | <p>Common Name- Kewada</p> <p>Botanical Name- Pandanous odoratissimus (Forssk.) Kuntze.</p> <p>Family- Pandanaceae.</p> | <p>It is a shrub with fragrant flowers.The flowers are used to extract aromatic oil otto called kewra ark.The distillate is used in the manufacture of perfumes,Paan masala, lotions, tobacco products,hair oil,cosmetics,soaps,incense sticks, etc.The oil contains methyl ether of phenyl alcohol[67%] & other compounds.Its essence is used to flavor sweets like rasgullas,petha,rasmalai etc[39].</p> |
| 40 | <p>Common Name-Hing</p> <p>Botanical Name- <i>Ferula assafoetida</i> L.</p> <p>Family-Apiaceae</p> | <p>It is oleo gum resin obtained from the rhizome and root of plant. It is used as a digestive aid, as a condiment and in pickles. It is widely used in India in food and as a medicine in ayurveda & unani .It is used in the treatment of hysteria, some nervous conditions, bronchitis, asthma and whooping cough. The volatile oil in the gum is eliminated through the lungs, making this an excellent treatment for asthma. It also thins the blood and lowers blood pressure[25].</p> |
| 41 | <p>Common Name-Black pepper,Kali mirch/miri</p> <p>Botanical Name- <i>Piper nigrum</i></p> <p>Family-Piperaceae</p> | <p>Black pepper oil can be used to help in the treatment of pain relief,rheumatism,chills,flu,colds,increase circulation, exhaustion, muscular aches, physical and emotional coldness, nerve tonic and fevers. It furthermore increases the flow of saliva, stimulates appetite, encourages peristalsis, tones the colon muscles and is a general digestive tonic[25].</p> |
| 43 | <p>Common Name- Lemon,<i>Citrus</i>,Limbu</p> <p>Botanical Name-<i>Citrus limon</i>. (L.) Burm.f.</p> <p>Family-Rutaceae.</p> | <p>Lemon juice, rind, and oil are used in a wide variety of foods like lemonade, soft drinks, cocktails, marmalade and lemon liqueur. Lemon zest, the grated outer rind of the fruit, is used to add flavor to baked foods, puddings, rice, & other dishes. The oil is used in the manufacture of Soaps,Talcs,tooth --pastes,shaving creams,perfumes,skin care products etc.</p> |
| 44 | <p>Common Name-sweet orange,Santra.</p> <p>Botanical Name-<i>Citrus sinensis</i> (L.) Osbeck.</p> <p>Family-Rutaceae</p> | <p>Oranges,whose flavor may vary from sweet to sour, are comm -nly peeled and eaten fresh or squeezed for juice. Juice is used to make Squash,jams,confectionary,soft drinks, biscuits cakes,Jelly,Gelatin,etc.Oil extracted is used to make Soaps, Talcs,shaving creams,perfumes,skin care products etc.In Maharashtra Nagpur district is famous for orange cultivation.</p> |

Economic Potential of Aromatic Plants-Reports by International trade centre.

[1] India's cosmetic market is estimated to be growing at 17% per year, and this is expected to be maintained over the next 5 years, with the market more than doubling in size by 2021. The cosmetics market comprises the following categories: skin care, hair care, fragrance, deodorant, colour cosmetics (i.e. mascara, blusher etc.) and oral care. Source: GCI Magazine

[2] Global Fragrances, Perfumes Market To Reach US\$45.6B by 2018- A report by Global Industry Analysts expects the global fragrances and perfumes market to reach about US\$45.6 billion by 2018, driven primarily by growth in under-penetrated emerging markets and innovative product launches as well as relatively new growth areas such as men's fragrance. According to the research report "Fragrances and Perfumes" developed regions have matured market profiles for fragrances and perfumes driven by the growing aging population, which uses perfumes

and fragrances less than younger groups. However, the report added that the “feel good factor” associated with fragrances and perfumes coupled with increasing demand from young men and women, the men’s fragrance segment, new product innovation and growing popularity of celebrity fragrances are the major factors triggering growth in the maturing markets.

[3] Asian markets showing strong growth in beauty products -Beauty products are an important user of essential oils, and growth in this sector remains strong in Asia. Recent reports give 7% annual average growth rate for Vietnam, 10% for Indonesia, 3% for Malaysia. The cosmetics market in Russia is expected to reach over US\$15 billion in 2015. These markets are important drivers for essential oil demand. Populations are large – 90 million in Vietnam, over 250 million in Indonesia – and incomes are increasing.

[4] Flavors and Fragrances market projected to grow to US\$35 billion by 2020- The global market for flavours and flavours is expected to grow to over US\$35 billion by 2019, according to a new report released by BCC Research. Highlights of the report are: The global flavour and fragrance market totaled \$23.9 billion in 2013. This market is expected to grow to US\$25.3 billion in 2014 and \$35.5 billion in 2019, a compound annual growth rate (CAGR) of 5.8%; The North American market was \$7.1 billion in 2013. This market is expected to grow to \$7.5 billion in 2014 and \$9.9 billion in 2019, with a CAGR of 5.7%. The Western Europe market was \$7.0 billion in 2013. This market is expected to grow to \$7.3 billion in 2014 and \$9.7 billion in 2019, with a CAGR of 5.8%. Source: BCC Research

[5] Indian spice exports look to be on track to meet 2014/15 fiscal year targets. During the first 6 months (April/September) total exports were over 420,000 tonnes, with a value of Rupees 69 billion. While chillies continue to be a major driver – export volumes increased by 17% to reach 161,000 tonnes and value by 23% to Rupees 15.5 billion, there was a strong performance across the spice and essential oil range. Mint and mint products (oils, menthol and menthol crystals) exports were 13,300 tonnes, valued at Rupees 14.6 billion. Exports of other spice oils and oleoresins reached 5,925 tonnes, valued at Rupees 8.7 billion. Source: Indian Spice Board

[6] Firmenich in Natural Ingredients JV with Jasmine Concrete Exports Firmenich (Switzerland) has signed a natural ingredients joint venture with Jasmine Concrete Exports PVT Ltd. (Chennai, India). Jasmine Concrete, which operates two manufacturing facilities in Tamil Nadu, the center of the Indian flower belt in South India, specializes in the extraction of Indian flowers, especially jasmine, sambac and tuberose. Firmenich said the joint venture significantly increases its production capacities in distillation, extraction and production of absolutes. In addition to expansion of the perfumery portfolio, the partnership is also expected to boost key sectors in flavor such as mints, vanilla and tropical fruits. Source: Perfumer & Flavorist.

CONCLUSION

In INDIA and world markets, demand for aromatic plant materials is increasing & going to increase in future. Current and future changes in lifestyles, increased Health awareness, and familiarity with plant products through media and scientific reports, can be expected to bring more & more people to using aromatic plant products.[11]

Rising consumer interest in 1] use of natural and organic products (Kroner 2006)[7],2] in protection of endangered species(FAO2003)[16],3] in intellectual property rights of native populations (Persley 1997)[22] , and 4] in the value of fair trade (Brinckmann 2004) [13] will continue to increase the cultivation conservation, trade & business of aromatic plants & their products locally as well as globally.

Consumer interest in aromatic plants is increasing in the world market place as segments of society become more aware of the possible relationships between good health and healthy living. To encash this opportunity of increasing demand of Aromatic plants & their products - globally, farmers, entrepreneurs, industrialists, government agencies, non government organisations, agricultural universities etc , should make every effort for wide spread popularisation & cultivation of Aromatic plants in all regions of Maharashtra & on every piece of land available.

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