



Review Article

## Study of essential oil bearing plants, their composition and Ayurvedic herbalism

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### Abstract

Plants are an important source of many products and play a significant role in the human lifestyle all over the world. Plants produce secondary metabolites in which essential oil is one of the important chemical constituents. It has a unique aromatic smell and is used in different industries for various biological activities. In Ayurveda, essential oil is used in aromatherapy which is an ancient therapeutic knowledge or practice for healing the health of humankind. Thus, this paper focuses on all important aspects such as essential oils and their applications, taxonomic details of essential oil-bearing plant species, IUCN status, chemical composition, and therapeutic significance.

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## 1. Introduction

Plants are an important source of many products and play a significant role in the human lifestyle all over the world. They produce two types of metabolites, i.e., primary and secondary metabolites. Primary metabolites include amino acids, nucleic acids, organic acids, carbohydrates, vitamins, lipids, and hormones which are quite significant for plant metabolism and their existence. Whereas secondary metabolites are organic compounds including terpenes, phenols, alkaloids, sulfur-containing compounds, and essential oils [1-3].

Essential oil is a secondary metabolite substance made up of volatile compounds responsible for its special flavor and odour. The aromatic oil compounds are found in cells, secretory cavities, or glandular hairs of various parts of the plant-like root, stem, bark, leaves,

bud, flowers, fruit, and seeds. The unique aroma makes the plant different from others which is why some plants can be identified easily by their fragrance such as basil, rose, jasmine, lavender, sandal, mint, peppermint, rosemary, citrus, camphor, cardamom, clove and many other plants. The organic compound of essential oils possesses anti-microbial, anti-viral, anti-oxidant, antiseptic, anti-hypertensive, anti-inflammatory, anti-biotic, antidepressant, antiseptic, antispasmodic properties and also has good psychogenic effects such as relieving stress and treating depression and insomnia [1, 2, 4].

Historical evidences reveal that aromatic oil has been used for various purposes such as medicinal, magical and religious ceremonies around the world for centuries. It is believed that essential oils and scented

ointments were used between 3000 and 2000 BC, in Indian and Chinese traditional medicinal systems which refer to many essential oil-producing aromatic plants and their healing effects. During the same period, ancient Egypt used essential oil & ointment for physical and physiological benefits, cosmetics, culinary and spiritual purposes. Greek history also documented the use of thyme, saffron, marjoram, peppermint and cumin in their healing systems. In the 18<sup>th</sup> and 19<sup>th</sup> centuries, the active component of essential oils was largely documented by many researchers and chemists who played an important role in creating awareness about the aromatic natural compound, their quality, and their effect on human health [5, 6, 23].

## 2. Results and discussion

### 2.1 Essential oils

Essential oils refer to natural, aromatic, volatile plant oils which are secondary metabolite products of plants that include terpenes, phenolic compounds, alkaloids and sulfur-containing compounds. These compounds are responsible for the unique odour, flavor and biological activities of the plant parts such as roots (Angelica), stem (Mentha, geranium), bark (Sassafras), wood (Sandalwood, rosewood), leaves (Basil, menthe, oregano), flower (Jasmine, rose, lily), fruit (Vanilla), peel (Bergamot), seed (Basil, coffee beans, nigella, almond) and berries (Juniper, pimento). These oil-containing compounds are found in special cells, oil-sac, and oil-secretory glands of the plant. These compounds are found in limited plant species which can be identified by their aroma. These aromatic plants belong to several families, but are abundant in the families like Apiaceae, Asteraceae, Geraniaceae, Lamiaceae, Lauraceae, Leguminosae, Poaceae, Rutaceae, and Zingiberaceae. These oils are generally obtained by hydro or steam distillation extraction method. Due to the presence of various amazing medicinal properties, several people prefer essential oils to other prescribed medicines. Essential oil exhibits antiviral, antibacterial, antifungal, antiseptic, anti-inflammatory, antidepressant, antineuralgic, antivenomous, antirheumatic, antispasmodic, antitoxic, sedative, nervine, digestive, analgesic, carminative, decongestive, expectorant, deodorant, restorative, circulatory, diuretic, vulnerary, insecticidal properties. They also assist in reducing inflammation, stress, anxiety, depression,

pain, nausea, and headache and help in boosting mood, improving digestion and sleep, as well as eliminating bacteria. Therefore, it is widely used in food flavors & preservatives, cosmetics, shampoo, hair oil, body oils, soap, lotions, insect repellent, toothpaste, laundry detergents and other industrial products [1-2, 4-5, 24-25]. A well-known therapy, 'aromatherapy', is famous for its use for physical and psychological well-being through inhalation, which shows the wide use and healing potential of essential oils [7-9, 21]. People of many countries depend on these plants as the source of primary medicines and also for their pharmaceutical and other industrial applications in the countries. There is a high demand for these plants as their oil is used around the world for several purposes. Consequently, high demand on a global scale puts these plants at risk of extinction. International Union for Conservation of Nature (IUCN) considered these plants as threatened species which listed in 'Red data book' under various categories such as least concern (LC), data deficient (DD), vulnerable (VU), endangered (EN) and critically endangered (CE). There are many plants popular for their specific aromatic oil or essential oil mentioned in Table.1 with their IUCN status, characteristics, chemical compositions and various pharmacological activities [9-11, 13].

### 2.2 Ayurvedic herbalism

It is an ancient science of India that heals various diseases and disorders through various plants and their extracts, that's why it is also known as a holistic healing system or natural healing system of understanding the effects, benefits, and inner workings of various herbal plants. It considers the taste, energy and post-digestive effects of herbs, and explores their impact on the vata, pitta and kapha doshas. This ancient science holds a long history of the use of essential oils in the pre-vedic and vedic periods [10, 15-16]. The perfume and scented items were renowned in this period for various religious and social practices. The utility of jasmine, champak, lotus, mango, hyacinth, basil, rose, lily, patchouli leaves, camphor, eucalyptus, sandalwood, and vetiver root in various ayurvedic practices are mentioned in ancient literature. Ayurvedic texts such as Charaka Samhita, Susruta Samhita, Ashtanga Hridaya, and Ashtanga Sangraha, mentioned the use of essential oils containing aromatic herbs, resin, barks, leaves,

**Table 1.** Essential oils bearing plants with characteristics, composition and pharmacological activities

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
1.	Ambrette seed oil ( <i>Abelmoschus moschatus</i> Medik.)  IUCN status: Least concern (LC)	Musk Mallow, Ornamental Okra	Seeds	Colour: Pale yellow Odor: A warm, sweet, musky aroma	Ambrettolide, ambrettolic acid, palmitic acid and farneso	Antispasmodic, aphrodisiac, carminative, nervine, stimulant, stomachic	[10, 12, 13, 14]
2.	Amyris essential oil ( <i>Amyris balsamifera</i> L.)  IUCN status: Least concern (LC)	Amyris, West Indian Sandalwood	Wood & Branches	Colour: Viscous pale yellow liquid Odor: Faintly woody aroma	Caryophyllene, cadinene and cadinol	Antiseptic, balsamic, sedative	[10, 12, 13, 14]
3.	Angelica root oil ( <i>Angelica archangelica</i> L.)  IUCN status: Least concern (LC)	Wild Celery, Masterwort, Angel's Herb	Roots	Colour: Pale yellow to orange-brown clear liquid Odor: Amber odor	Phellandrene, pinene, limonene, linalol and borneol; osthol, angelicin, bergapten and imperatorin	Antispasmodic, carminative, depurative, diaphoretic, digestive, diuretic, febrifuge, nervine, stimulant	[10, 12, 13, 14]
3.	Aniseed oil ( <i>Pimpinella anisum</i> L.)	Aniseed	Seeds	Colour: Colourless to pale yellow liquid Odor: Warm, spicy-sweet characteristic scent	Trans-anethole	Antiseptic, antispasmodic, carminative, diuretic, expectorant, galactagogue, stimulant	[10, 12, 14]
4.	Armoise oil ( <i>Artemisia vulgaris</i> L.)  IUCN status: Least concern (LC)	Wormwood, Mugwort	Leaves and twigs	Colour: Pale yellow & Camphoraceous and sweet scent Odor: Camphoraceous and sweet scent	Thujone, camphor, cineol, pinenes, dihydromatricaria ester	Anthelmintic, antirheumatic antispasmodic, carminative, choleric, nervine, stimulant	[10, 12, 13, 14]
5.	Basil oil ( <i>Ocimum basilicum</i> L.)	Common Basil, Sweet Basil	Leaves	Colour: Yellow or pale green Odor: Sweet-herbaceous odor with a camphoraceous tinge	methyl chavicol, linalol, cineol, camphor, eugenol, limonene, citronellol	Antidepressant, antiseptic, antispasmodic, carminative, cephalic, digestive	[10, 12, 14]
6.	Betel leaf oil ( <i>Piper betle</i> L.)	Betel	Leaves	Colour: Clear yellow to dark brown liquid Odor: Creosote-like aroma	Betel phenol (chavibetol), chaviol and cadinene	Stimulating, carminative, aromatic, antiseptic, warming and aphrodisiac	[12, 14]
7.	Birch tar oil ( <i>Betula alba</i> L.)	Beithe, Bereza, Birch	Barks	Colour: Dark brown to orange liquid Odor: Spicy, warm aroma	Cadinene, salicylic acid, methyl salicylate, betulene and betulenol	Anti-inflammatory, antiseptic, cholagogue, diaphoretic, diuretic, febrifuge, tonic	[10, 12, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
8.	Bitter orange oil ( <i>Citrus × aurantium</i> L.)	Seville orange, bitter orange	Peel	Colour: Pale yellow to yellow clear liquid Odor: Fruity, sweet, citrusy fragrance	Limonene, camphene, myrcene, pinene, cymene, ocimene	Antidepressant, anti-inflammatory, antiseptic, antispasmodic, astringent, bactericidal, carminative, deodorant, digestive, fungicidal, stimulant	[10, 12, 14]
9.	Black seed ( <i>Nigella sativa</i> L.)	Kalonji	Seeds	Colour: Deep Amber/Dark color Odor: ---	Linoleic acid, thymoquinone, nigellone (dithymoquinone), melanthin, nigilline	Anti-histamine, anti-oxidant, anti-allergic, anti-infective, digestive, broncho-dialating	[10, 12, 14]
10.	Bergamot oil ( <i>Citrus × bergamia</i> (Risso) (Risso & Poit.)	Bergamot	Peel	Colour: Golden yellow amber clear liquid Odor: Citrus woody orange odor	Linalyl acetate, linalool, limonene, nerol, terpenes	Analgesic, antidepressant, antiseptic, antibiotic, deodorant, digestive, febrifuge, insect repellents	[10, 12, 14]
11.	Cade oil ( <i>Juniperus oxycedrus</i> L.)  IUCN status: Least concern (LC)	Cade Juniper	Branche s and heartwo od	Colour: Dark red-brown colour viscous liquid Odor: Strong empyreumatic tar-like odor & warm bitter taste	Cadinene, cadinol, p-cresol, guaiacol	Analgesic, antimicrobial, antipruritic, antiseptic, disinfectant, parasiticide, vermifuge	[10, 12, 13, 14]
12.	Cajeput oil ( <i>Melaleuca cajuputi</i> Maton & Sm. ex R. Powell)  IUCN status: Least concern (LC)	Cajeput, White tea tree	Leaves & Twigs	Colour: Colorless to pale yellow Odor: Eucalyptus like, camphoraceous odor	Cajeputene hydrate, eucalyptol, cajuputol, terpineol	Analgesic, antimicrobial, antineuralgi, anthelminti, diaphoretic, carminative, expectorant, febrifuge, insecticide, sudorific	[10, 12, 13, 14]
13.	Camphor oil ( <i>Cinnamomum camphora</i> (L.) (J. Presl)  IUCN status: Least concern (LC)	Camphor tree	Woods	Colour: Colorless to pale yellow liquid Odor: Camphorous odor	Ketones, Safrole, Phenolic Ethers, Borneol, Terpene Alcohol and Pinene	Anti-inflammatory, antiseptic, antiviral, bactericidal, diuretic, expectorant, stimulant, rubefacient, vermifuge	[10, 12, 13, 14]
14.	Cardamom oil ( <i>Elettaria cardamomum</i> (L.) Maton)	Cardamom	Fruits	Colour: Pale yellow liquid Odor: Sweet spicy, warming fragrance	Terpinyl acetate, cineol, limonene, sabinene, linalol, linalyl acetate,	Antiseptic, antispasmodic, aphrodisiac, carminative, cephalic,	[10, 12, 13, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
				IUCN status: Least concern (LC)	[10]	pinene, zingiberene	digestive, stimulant, stomachic
15.	Cedarwood oil ( <i>Cedrus deodara</i> (Roxb. ex D. Don) G. Don)	Devdar, Himalayan Cedar	Woods	Colour: Light golden yellow viscous transparent liquid Odor: Woody, sweet, slight aroma	atlantone, caryophyllene, cedrol, cadinene, a-cedrene, b-cedrene, thujopsene, sesquiterpenes	Antiseborrheic, antiseptic, antispasmodic, astringent, diuretic, emmenagogue, expectorant, fungicide insecticide, sedative	[10, 12, 13, 14]
				IUCN status: Least concern (LC)			
16.	Chamomile oil ( <i>Matricaria chamomilla</i> L.)	Chamomile	Flowers	Colour: Pale yellow to amber liquid Odor: Herbal like chamomile odor	Chamazulene, bisabolol oxide A, a-bisabolol, bisabolol oxide B & bisabolone oxide, flavonoids, coumarins	Analgesic, anti-depressant, antispasmodic, antiseptic, antibiotic, anti-inflammatory, anti-infectious, anti-neuralgic, carminative, vulnerary, sedative, nervine, digestive, tonic	[10, 12, 13, 14]
				IUCN status: Least concern (LC)			
17.	Chamomile oil (Roman) ( <i>Anthemis nobilis</i> L.)	Roman camomile	Flowers	Colour: Pale yellow clear liquid Odor: Sweet, spicy, fresh, herbal, green odor	Angelical, azulene, methacrylic, butyric and tiglic acids	Analgesic, anti-spasmodic, antiseptic, anti-inflammatory, anti-infectious, antidepressant, antineuralgic, carminative, sedative, nervine	[10, 12, 13, 14]
				IUCN status: Least concern (LC)			
18.	Champaca oil ( <i>Magnolia champaca</i> (L.) Baill. ex Pierre) [12]	Champa	Flowers	Colour: Reddish Brown transparent liquid Odor: Unique and appealing fragrance	Linalool, benzyl acetate, beta-lonone, phenyl ethyl alcohol	Aphrodisiac, emollient, febrifuge; warming, calming, reducing stress, euphoric	[10, 12, 13, 14]
				IUCN status: Least concern (LC)			
19.	Chulmoogra oil ( <i>Hydnocarpus pentandrus</i> (Buch.-Ham.) Oken)	Chaulmoogra	Seeds	Colour- Pale yellow viscous liquid Odor- Strong, woody aroma	Oleic, palmitic, linoleic, linolenic, stearic	Anti-leprosy, anti-bacterial, anti-fungal, larvicidal, antioxidant,	[10, 12, 13, 14]
				IUCN status: Vulnerable (VU)			
20.	Cinnamon oil [10, 11, 14] ( <i>Cinnamomum verum</i> J.Presl) [12]	Cinnamon	Stem, Bark	Colour: A yellow to brownish liquid Odor: Sweet, warm spicy, dry, tenacious odor	Eugenol, benzyl benzoate, cinnamaldehyde	Antibacterial, Antidiabetic, Antiinflammatory, Antioxidant, Antipyretic, Immunological effects, Insecticidal	[10, 11, 12, 14]
				IUCN status: Least concern (LC)			
21.	Citriodora oil ( <i>Eucalyptus citriodora</i> Hook.)	Eucalyptus	Leaves	Colour- Vintage oils turn slightly yellow	Citronellal, citronellol,	Antiseptic, antiviral, bactericidal,	[10, 12, 13, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
				Odor-Fresh, Cooling, Camp-horaceous, woody undertones	Geraniol, pinene	deodorant, expectorant, fungicidal, insecticide	
22.	Citronella oil ( <i>Cymbopogon winterianus</i> Jowitt ex Bor)	Java citronella	Leaves	Colour- Pale yellow to dark yellow clear liquid Odor-Fresh, sweet, weedy, woody odor	Geraniol; citronellic acid, borneol, citronellol, citronellal, camphene, dipentene and limonene	Antiseptic, bactericidal, deodorant, warming, mood uplifter, and insecticide	[10, 12, 14]
23.	Clary Sage oil ( <i>Salvia sclarea</i> L.)	Clary sage	Flowering tops	Colour- Colorless to brown yellow clear liquid Odor: Fresh weedy, spicy-like herbal tea odor	Linalyl acetate, linalol, pinene, myrcene and phellandrene	Anti-inflammatory, anticonvulsive, antidepressant, antiseptic, nervine, astringent, bactericidal	[10, 12, 13, 14]
				IUCN status: Least concern (LC)			
24.	Clove oil ( <i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry)	Clove	Bud	Colour: Pale yellow liquid Odor: Sweet spicy Odor [10]	Eugenol, eugenyl acetate	Anesthetic, Antibacterial, Anticancerous, Anti-inflammatory, Antioxidant, Antipyretic, Antithrombotic, Antiviral, Insecticidal	[10, 11, 12, 14]
25.	Coffee oil ( <i>Coffea arabica</i> L.)	Coffee beans	Seeds	Colour- Dark Brown Odor- Fresh brewed pot of coffee odor	Caffeine	Antioxidant, diuretic, stimulant, deodorizer	[10, 12, 13, 14]
				IUCN status: Endangered (EN)			
26.	Coriander oil [10, 11, 14] ( <i>Coriandrum sativum</i> L.) [12]	Coriander	Fruits	Colour: A colourless to pale yellow liquid Odor: Sweet, woody-spicy, slightly musky odor	Linalool, decyl aldehyde, borneol, geraniol, carvone, anethole	Aflatoxin, Antimicrobial, Antioxidant, Insecticidal	[10, 12, 13, 14]
27.	Costus oil ( <i>Saussurea costus</i> (Falc.) Lipsch.)	Costus	Roots	Colour: Yellow to brownish-yellow viscous liquid Odor: Extremely tenacious odor	Sesquiterpene lactones	Antiseptic, antispasmodic, antiviral, bactericidal, carminative, digestive, expectorant, febrifuge, stimulant	[10, 12, 13, 14]
				IUCN status: Critically Endangered (CE)			
28.	Cumin Oil ( <i>Cuminum cyminum</i> L.)	Cumin	Fruits	Colour-Pale yellow or greenish liquid Odor- Warm, soft, spicy-musky odor	Cuminaldehyde, b-pinene, cis-β-farnesene	Antimicrobial, antioxidant, antispasmodic, carminative, chemoprotective, stimulant	[10, 11, 12, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
29.	Custard Apple oil ( <i>Amnona squamosa</i> L.) IUCN status: Least concern (LC)	Custard Apple	Seeds	Colour- Pale green to lemony thick liquid Odor- Sweet, woody aroma	A & β-pinene, E-ocimene, germacrene-D, methyl and ethyl butanoate	Anti-rheumatic, astrigent, emmenagogue, febrifuge, purgative, tonic, digestive	[10, 12, 13, 14]
30.	Cypress oil ( <i>Cupressus sempervirens</i> L.) IUCN status: Least concern (LC)	Cypress	Needles	Colour: Pale amber clear oily liquid Odor: Sweet, balsamic and spicy odor	Pinene, camphene, sylvestrene, cymene, sabinol	Antirheumatic, antiseptic, antispasmodic, astrigent, deodorant, diuretic, hepatic, styptic, sudorific, tonic, vasoconstrictive	[10, 12, 13, 14]
31.	Cypriol oil (Nagarmotha oil) ( <i>Cyperus scariosus</i> R.Br.)	Nagarmotha	Roots	Colour: Amber clear viscous liquid Odor: Woody, earthy, spicy like cinnamon odor	Cyperone, selinene, cyperene, cyperotundone, patchoulone, sugeonol, kobusone, isokobusone	Antiseptic, demulcent, diaphoretic, diuretic, febrifuge, stimulant, tonic	[10, 12, 14]
32.	Davana oil ( <i>Artemisia pallens</i> Wall. ex DC.)	Davana	Flowering tops	Colour: Pale yellow to yellowish-brown clear liquid Odor: Fruity, leafy, balsam, raisin-like odor.	Davanone, bicyclogermacrene, davana ether, ethyl cinnamate,	Antidepressant, anti-infectious, aphrodisiac, calmative, emollient, mucolytic, nervine, stimulator	[10, 12, 14]
33.	Elemi oil ( <i>Canarium luzonicum</i> (Blume) A.Gray) IUCN status: Near Threatened	Manila Elemi,	Resin	Colour-Pale Yellow Liquid Odor- Fresh, balsamic-spicy, lemonlike odor	Phellandrene, dipentene, elemol, elemicin, terpineol, carvone and terpinolene	Antiseptic, analgesic, anti-infectious, cicatrisant, expectorant, stimulant,	[10, 12, 13, 14]
34.	Eucalyptus oil ( <i>Eucalyptus globulus</i> Labill.) IUCN status: Least concern (LC)	Eucalyptus	Leaves & branches	Colour-Colourless to pale yellow clear liquid Odor-Fresh, balsamic, camphor-like odor.	Cineol, pinene, limonene, cymene, phellandrene, terpinene, aromadendrene	Aperitif, antiseptic, antispasmodic, antineuralgic, antirheumatic, antiseptic, carminative, depurative, deodorant, parasiticide	[10, 12, 13, 14]
35.	Frankincense oil ( <i>Boswellia serrata</i> Roxb.)	Frankincense, Luban, Gond	Resin	Colour- Pale yellow or pale-amber in color Odor- Strong, fresh, balsamic scent	B-caryophyllene, alpha-copaene, alpha-humulene, caryophyllene oxide	Antiseptic, astrigent, carminative, digestive, diuretic, sedative	[10, 12, 14]
36.	Gandhapura oil/ Gandharan oil ( <i>Gaultheria fragrantissima</i> Wall.) IUCN status: Least concern (LC)	Gandhapura, Indian wintergreen	Seeds	Colour- Brownish liquid Odor- Typical aroma	Gaultherin and salicylic acid	Antirheumatic, anti-inflammatory, stimulator, repellent, pain reliever, antibacterial, antiseptic	[10, 12, 13, 14]



**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
37.	Geranium oil ( <i>Pelargonium graveolens</i> L'Hér.)	Geranium	Leaves, stalks and flowers	Colour- Yellow-green to green clear liquid Odor-Floral, green, spicy & rosy odor	Citronellol, geraniol, linalol, menthone, phellandrene, sabinene, limonene	Antidepressant, antihemorrhagic, anti-inflammatory, antiseptic, astringent, cicatrisant, deodorant	[10, 12, 14]
38.	Ginger oil ( <i>Zingiber officinale</i> Roscoe)  IUCN status: data deficient	Ginger		Colour: A pale yellow, amber or greenish liquid Odor: A warm, slightly green, fresh, woody-spicy odor	Gingerol, shogaol, citral, zingiberene, ar-curcumene	Anticancer, Anti-convulsive, Anti-inflammatory, anti-oxidant, antiplatelet, anti-ulcer, cardiovascular	[10, 11, 12, 13, 14]
39.	Ginger grass oil ( <i>Cymbopogon martini</i> (Roxb.) (W. Watson)	Ginger grass	Leaves	Colour: Yellow to light brown liquid Odor: Sharp, green scent with pepper and lemon undertones odor	Geraniol; farnesol, geranyl acetate, methylheptenone, citronellol	Antiseptic, bactericidal, cicatrisant, digestive, febrifuge, hydrating, stimulant	[10, 12, 14]
40.	Grapefruit oil [10, 14] ( <i>Citrus × paradisi</i> Macfad.) [12]	Grapefruit	Peel	Colour- Yellowish to reddish yellow clear liquid. Odor- sweet dry citrus grapefruit odor	Limonene, cadinene, paradisiol, neral, geraniol, citronellal, sinensal	Antiseptic, antitoxic, astringent, bactericidal, diuretic, depurative, stimulant	[10, 12, 14]
41.	Hedychium oil ( <i>Hedychium spicatum</i> sm.)  IUCN status: Data Deficient	Ginger lily	Roots (rhizomes)	Colour: Pale yellow viscous liquid Odor: Warm woody, slightly spicy, slightly sweet smell	Ethyl ester of p-methoxy cinnamic acid, sesquiterpenes, methyl paracumarine acetate	Antibacterial, anti-inflammatory, antiseptic, carminative, digestive, expectorant, stimulant	[10, 12, 13, 14]
42.	Henna oil ( <i>Lawsonia inermis</i> L.) IUCN status: Least concern (LC)	Henna	Leaves	Colour: Rich orange thick liquid Odor: Luscious floral aroma	Ethyl hexadecanoate, (E)-methyl cinnamate, isocaryophyllene, β-ionone and methyl linolenate	Antibacterial, anti-inflammatory, antidandruff, antifungal, antiparasitic, molluscicidal, antioxidant, hepatoprotective, central nervous	[10, 12, 13, 14]
43.	Holy Basil ( <i>Ocimum sanctum</i> L.)	Holy Basil, Tulsi	Leaves & Seeds	Colour: Pale yellow to yellow colour Odor: Sweet, Pungent and typical odor of Eugenol	Eugenol (1-hydroxy-2-methoxy-4-allylbenzene)	Antidepressant, antiseptic, antispasmodic, carminative, cephalic, digestive	[10, 12, 14]
44.	Jasmin oil ( <i>Jasminum officinale</i> L.)	Common Jasmine	Flowers	Colour: Deep brown with a golden tinge viscous liquid Odor: A warm, floral, exotic odor	Benzyl acetate, linalol, phenylacetic acid, benzyl alcohol, farnesol, methyl anthranilate, cis-jasmone, methyl jasmonate	Analgesic (mild), antidepressant, anti-inflammatory, antiseptic, antispasmodic, aphrodisiac, carminative, cicatrisant, expectorant, galactagogue, parturient, sedative, tonic	[10, 12, 14]



**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
45.	Jasminum Sambac oil ( <i>Jasminum sambac</i> (L.) Aiton)	Jasmine	Flowers	Colour: Deep brown with a golden tinge viscous liquid Odor: Warm, floral, exotic, honey/tea notes odor	Benzyl acetate, linalol, phenylacetic acid, benzyl alcohol, farnesol, methyl anthranilate, cis-jasmone, methyl jasmonate	Analgesic (mild), antidepressant, anti-inflammatory, antiseptic, antispasmodic, aphrodisiac, carminative, cicatrisant, expectorant, galactagogue, parturient, sedative, tonic	[10, 12, 14]
46.	Juniper Berry oil ( <i>Juniperus communis</i> L.)	Common Juniper	Berry	Colour: Pale yellow clear liquid Odor: A fresh, clear, slightly woody aroma	Monoterpenes; sabinene, limonene, cymene, thujene and camphene	antidepressant, antiseptic, astringent, cicatrisant, diuretic, deodorant, haemo-static, styptic, sedative, tonic	[10, 12, 14]
47.	Kewra oil [10, 14] ( <i>Pandanus odorifer</i> (Forssk.) Kuntze) [12] IUCN status: Least concern (LC) [13]	Kewra/ Kevada	Flowers	---	2-phenylethyl-methylether	Antioxidant, anti-septic antifungal, anti-inflammatory, Immune enhancer	[12, 13, 14]
48.	Lavender oil ( <i>Lavandula officinalis</i> Chaix Syn. <i>Lavandula angustifolia</i> subsp. <i>angustifolia</i> )  IUCN status: Least concern (LC)	Lavender	Flowers	Colour: Colourless to pale yellow liquid Odor: Sweet, floral-herbaceous scent and balsamic-woody undertone	Linalyl acetate, linalol, lavandulol, lavandulyl acetate, terpineol, cineol, limonene, ocimene, caryophyllene	Analgesic, anticonvulsive, antidepressant, antimicrobial, antirheumatic, antiseptic, antispasmodic, deodorant, diuretic, emmenagogue, hypotensive, insecticide, nervine	[10, 12, 13, 14]
49.	Melissa oil ( <i>Melissa officinalis</i> L.)  IUCN status: Least concern (LC)	Lemon Balm, Lemon Balsam	Flowers & Leaves	Colour: Yellow color Odor-Fresh, lemony, herbaceous scent	Citral, citronellol, eugenol, geraniol, linalyl acetate	Antidepressant, antihistaminic, antispasmodic, bactericidal, diaphoretic, emmenagogue, febrifuge, hyper-tensive, insect repellent, nervine, sedative	[10, 12, 13, 14]
50.	Lemon oil ( <i>Citrus × limon</i> (L.) Osbeck)	Lemon	Peel	Colour: Pale yellow with a greenish tint Odor: A strong, clear, citrus odor	Limonene, citral, geranial, citronellyl acetate, pinene, carotene, pectin	Anti-anaemic, antimicrobial, antirheumatic, anti-scorbutic, antiseptic, antispasmodic, antitoxic, cicatrisant, haemostatic, hypotensive, insecticidal, rubefacient, stimulates white, corpuscles, vermifuge	[10, 12, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
51.	Lemon Verbena oil ( <i>Aloysia citrodora</i> Paláu)	Verbena Lemon	Leaves	Colour: A pale olive or yellow liquid Odor: A sweet, fresh, lemony, fruity-floral, fragrance	Citral, nerol, geraniol	Antiseptic, antispasmodic, antibacterial, antiseptic, carminative, detoxifying, digestive, hepatobiliary, stimulant, sedative, stomachic	[10, 12, 14]
52.	Lemongrass oil ( <i>Cymbopogon citratus</i> (DC.) Stapf)	Lemon grass	Leaves	Colour: Pale yellow to yellow liquid Odor: Lemony, green, citral, floral and citrus-like odor	Citral, myrcene, dipentene, methylheptenone, linalol, geraniol, nerol, citronellol, farnesol	Analgesic, antidepressant, antimicrobial, antioxidant, antipyretic, antiseptic, astringent, bactericidal, carminative, deodorant	[10, 12, 14]
53.	Lily oil ( <i>Lilium auratum</i> Lindl.)	Lily	Flower Petals	Colour: Pale yellow clear liquid Odor: Rich, warm, heady floral and yet subtle aroma	Polysaccharides and saponins	Antidepressant, anti-tumor, hypoglycemic, antibacterial, anti-oxidation, anti-inflammatory	[10, 12, 14]
54.	Melissa oil ( <i>Melissa officinalis</i> L.)  IUCN status: Least concern (LC)	Lemon balm	Leaves & Tops	Colour: Pale yellow liquid Odor: Sweet citrus citronella odor	Citral, citronellol, eugenol, geraniol, linalyl acetate	Antidepressant, antihistaminic, antispasmodic, bactericidal, carminative, diaphoretic, emmenagogue, hypertensive, insectrepellent, nervine, sedative	[10, 12, 13, 14]
55.	Mentha Citrata oil ( <i>Mentha citrata</i> Ehrh.)	Mentha	Leaves	Colour: Colourless to yellowish clear liquid Odor: Sweet fresh clary lavender Bergamot odor	Linalyl acetate, linalool, terpenes	Deodorant, expectorant, parasiticide, perfume, sedative, stimulant, stomachic, tonic	[10, 12, 14]
56.	Mint oil ( <i>Mentha arvensis</i> L.)  IUCN status: Least concern (LC)	Corn mint, Wild mint	Leaves & Stem	Colour: Clear to pale yellow, sometimes greenish thin liquid Odor: Fresh, sweet, menthol-minty, herbaceous fragrance	Menthol, menthone, menthyl acetate, cineole, limonene, phellandrene, pinene, $\beta$ -caryophyllene	Anaesthetic, antimicrobial, antiseptic, antispasmodic, carminative, cytotoxic, digestive, expectorant, stimulant, stomachic	[10, 12, 13, 14]
57.	Myrrh oil ( <i>Commiphora myrrha</i> (T.Nees) Engl.)  IUCN status: Least concern (LC)	Commiphora myrrha	Resin	Colour: Yellow amber to the greenish-brown clear oily liquid Odor: Rich, balsamic, spicy, warm, earthy, woody aroma	Heerabolene, limonene, dipentene, pinene, eugenol, cinnamaldehyde, cuminaldehyde, cadinene	Anticatarrhal, anti-inflammatory, antimicrobial, antiphlogistic, astringent, expectorant, antiseptic, fungicidal, revitalizing, sedative, stimulant-digestive, pulmonary tonic	[10, 12, 13, 14]
58.	Myrtle oil ( <i>Myrtus communis</i> Blanco)  IUCN status: Least concern (LC)	Common myrtle, Roman myrtle	Leaves & Tops	Colour: Pale amber liquid Odor: Fresh camphor floral-herbal odor	Cineol, myrtenol, pinene, geraniol, linalol, camphene	Anticatarrhal, antiseptic (urinary, pulmonary), astringent, balsamic, bactericidal, expectorant, regulator, slightly sedative	[10, 12, 13, 14]

Table 1. (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
59.	Neroli essential oil, Orange blossom oil ( <i>Citrus × aurantium</i> L.)	Bitter orange	Flowers	Colour: Coffee brown clear liquid Odor: Sweet floral fragrance	Linalol, linalyl acetate, limonene, pinene, nerolidol, geraniol, nerol, methyl anthranilate, indole, citral, jasmone	Antidepressant, antiseptic, antispasmodic, aphrodisiac, bactericidal, carminative, cicatrisant, cordial, deodorant, fungicidal, hypnotic, stimulant, tonic	[10, 12, 13, 14]
60.	Nutmeg essential oil ( <i>Myristica fragrans</i> Houutt.)  IUCN status: Data Deficient (DD)	Nutmeg	Leaves & Twigs	Colour: Pale yellow clear liquid Odor: Spicy, woody, nutmeg fragrance	Monoterpene hydrocarbons, terpinen-4-ol, pinene, sabinene, cineole, camphene, limonene, myristicin, alpha terpenene.	Analgesic, antiemetic, antioxidant, antirheumatic, antiseptic, antispasmodic, aphrodisiac, carminative, secretory stimulant, larvicidal, orexigenic, prostaglandin inhibitor	[10, 12, 13, 14]
61.	Palmarosa oil ( <i>Cymbopogon martini</i> (Roxb.) Will. Watson)	Palmarosa Grass	Leaves	Colour: Yellow clear liquid Odor: Floral, woody and slight hint of citrusy fragrances	Geraniol, farnesol, geranyl acetate, methyl heptenone, citronellol, citral, dipentene, limonene	Antiseptic, bactericidal, cicatrisant, digestive, febrifuge, hydrating, stimulant (digestive, circulatory)	[10, 12, 14]
62.	Patchouli oil ( <i>Pogostemon cablin</i> (Blanco) Benth.)	Patchouly or Pachouli	Leaves	Colour: Brownish-orange reddish clear liquid Odor: Heavy, exotic, rich, balsamic, herbaceous aroma	Patchouli alcohol, pogostol, bulnesol, nor patchoulenol, bulnese, patchoulene	Antiseptic, antifungal, antidepressant, sedative, nerve tonic, aphrodisia stimulant	[10, 12, 14]
63.	Peppermint Oil ( <i>Mentha × piperita</i> L.)	Peppermint/Mentha	Leaves & Stem	Colour: Clear to pale-yellow, some-times greenish thin liquid, odor: Fresh, sweet, menthol-minty, herbaceous fragrance	Menthol, menthone, menthyl acetate, menth-ofuran, limonene, pulegone, cineol	Analgesic, anti-inflammatory, antimicrobial, antiphlogistic, antipruritic, antiseptic, antispasmodic, antiviral, astringent, carminative, cephalic, nervine	[10, 12, 14]
64.	Peru Balsam oil ( <i>Myroxylon balsamum</i> (L.) Harms)  IUCN status: Least concern (LC)	Peru Balsam	Bark	Colour: Dark brown viscous liquid. Odor: Sweet cinnamon vanilla balsam	Resin, cinnamic acids, terpenes, eugenol, vanillin	Antitussive, antiseptic, balsamic, expectorant, stimulant	[10, 12, 13, 14]
65.	Petitgrain oil ( <i>Citrus × aurantium</i> L.)	Bitter orange tree	Leaves & Twigs	Colour: Clear to a yellow tinge transparent liquid Odor: Fresh, floral, citrusy, lighter in fragrance than neroli and slightly woody fragrance	Linalyl acetate, linalol, nerol, alpha-terpineol, geranyl acetate, limonene, myrcene	Antiseptic, antispasmodic, deodorant, digestive, nervine, stimulant (digestive, nervous), stomachic, tonic	[10, 12, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
66.	Pimento Berry oil ( <i>Pimenta dioica</i> (L.) Merr.)  IUCN status: Least concern (LC)	Pimento, Allspice, Jamaica pepper,	Berries	Colour: Colorless yellow or reddish-yellow liquid Odor: A spicy odor	Eugenol, methyl eugenol, cineol, Phellandrene, caryophyllene	Anaesthetic, analgesic, antioxidant, antiseptic, carminative, muscle relaxant, rubefacient, stimulant, tonic	[10, 12, 13, 14]
67.	Pine essential oil ( <i>Pinus sylvestris</i> L.)  IUCN status: Least concern (LC)	Pine	Needles, twigs and cones	Colour: Colorless to amber clear oily liquid. Odor: Fresh, sweet-resinous, woody, turpentine, conifer-ous, balsamic fragrance	Monoterpene hydrocarbons, bornyl acetate, cineol, citral, chamazulene	Antimicrobial, antineuralgic, antirheumatic, antiscorbutic, antiseptic, antiviral, bactericidal, balsamic, cholagogue, cholaretic, deodorant, stimulant	[10, 12, 13, 14]
68.	Babchi oil ( <i>Psoralea corylifolia</i> L.) (syn. <i>Cullen corylifolium</i> (L.) Medik.) IUCN status: Least concern (LC)	Psoralea oil, Babchi oil	Seeds	Colour: Greenish liquid Odor: A sweet balsamic aroma	Limonene, 4-terpineol, linalool, angelicin, geranylacetate, psoralene, bacheliol, $\beta$ -caryophell-enoxide	Anthelmintic, Aphrodisiac, purgative, stimulant, stomachic, vulnerary	[10, 12, 13, 14]
69.	Rose oil (Centifolia) ( <i>Rosa <math>\times</math> centifolia</i> L.)	Rose	Flowers	Colour: Pale yellow clear liquid Odor: A sweet, floral, rosy odor	Citronellol, phenyl ethanol, geraniol, nerol, stearopten, farnesol	Antidepressant, anti-phlogistic, anti-septic, antispasmodic, antitubercular, anti-viral, aphrodisiac, astringent, bactericidal, cholaretic, cicitrisant, haemostatic, hepatic, laxative, sedative (nervous)	[10, 12, 14]
70.	Rose oil (Damascena) ( <i>Rosa <math>\times</math> damascena</i> Herrm.)	Rose	Flowers	Colour: Deep yellow to brownish red thick liquid Odor: A floral, honey-like, intense and sweet odor	Citronellol, phenyl ethanol, geraniol, nerol, stearopten, farnesol	Antidepressant, anti-phlogistic, anti-septic, antispasmodic, anti-tubercular, anti-viral, aphrodisiac, astringent, bactericidal, cicitrisant, haemostatic, hepatic, laxative, sedative	[10, 12, 14]
71.	Rosemary oil ( <i>Salvia rosmarinus</i> Spenn.)  IUCN status: Least concern (LC)	Rosemary	Leaves and flowering tops	Colour: Colorless to a pale yellow clear liquid Odor: Herbal, camphor, woody, and balsam fragrance	Pinenes, camphene, limonene, cineol, borneol with camphor, linalol, terpineol, octanone, bornyl acetate	Analgesic, Antibacterial, antidepressant, antifungal, antiseptic, antispasmodic, astringent, carminative, cholagogue, hypertensive, nervine	[10, 12, 13, 14]
72.	Sandalwood oil ( <i>Santalum album</i> L.)  IUCN status: Vulnerable (VU)	Indian Sandalwood	Woods	Colour: A pale yellow, greenish or brownish viscous liquid Odor: A deep, soft, sweet-woody balsamic scent	Santalols, sesquiterpene hydrocarbons	Antidepressant, anti-phlogistic, antiseptic (urinary and pulmonary), antispasmodic, aphrodisiac, astringent, bactericidal, carminative, cicatrisant, diuretic, expectorant, fungicidal, insecticidal, sedative, tonic	[10, 12, 13, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
73.	Spearmint essential oil ( <i>Mentha spicata</i> L.) IUCN status: Least concern (LC)	Spearmint	Leaves	Colour: Colorless to pale yellow clear oily liquid Odor: A minty, slightly fruity aroma that is less bright than peppermint	L-carvone, dihydrocarvone, phellandrene, limonene, menthone, menthol, pulegone, cineol, linalol, pinenes	Anaesthetic, antiseptic, antispasmodic, astringent, carminative, cephalic, cholagogue, decongestant, digestive, diuretic, expectorant, febrifuge, hepatic, nervine, stimulant, stomachic, tonic	[10, 12, 13, 14]
74.	Spikenard oil (Jatamansi oil) ( <i>Nardostachys jatamansi</i> (D.Don DC.) IUCN status: Critically Endangered (CE)	Spikenard, Jatamansi, Indian Nard	Roots (Rhizomes)	Colour: Amner clear liquid-liquid Odor: A sweet, woody, spicy like valerian, and ginger odor	Bornyl acetate, isobornyl valerate, borneol, patchouli alcohol, terpinyl valerate, terpineol, eugenol, pinenes	Anti-inflammatory, antipyretic, bactericidal, deodorant, fungicidal, laxative, sedative, tonic	[10, 12, 13, 14]
75.	St. John's Wort Oil ( <i>Hypericum perforatum</i> L.) IUCN status: Least concern (LC)	Klamath weed, Tipton's weed	Flowers	Colour: Brownish-reddish oil Odor: Floral, characteristics odor	Glycosides, flavonoids, tannins, resin, volatile oil	Antidepressant, diuretic, expectorant, hypertensive, insecticidal, restorative, rubefacient, stimulant (adrenal cortex & nervous system)	[10, 12, 13, 14]
76.	Sugandh Mantri oil ( <i>Homalomena aromatica</i> (Spreng.) Schott)	Sugandh mantri	Crushed roots	Colour: Light yellow Odor: Refreshing pleasant spicy & a typical note of linalool	Thymol, pinene, methyl anthranilate, indole, benzyl alcohol	Antidepressant Anti-inflammatory, antispasmodic, assists in meditation, for spiritual healing, calming the nerves	[10, 12, 14]
77.	Sweet orange oil ( <i>Citrus × sinensis</i> (L.) Osbeck)	Sweet orange	Peel	Colour: Yellow-orange to deep orange clear liquid Odor: Fruity, sweet, citrusy fragrances	Limonene, linalool, citronellal, neral, geranial, pinene, sabinene, myrcene, terpeneol, carotin	Antidepressant, anti-inflammatory, antiseptic, bactericidal, carminative, choleric, digestive, fungicidal, hypotensive, sedative (nervous), stimulant, stomachic	[10, 12, 14]
78.	Tagetes oil ( <i>Tagetes minuta</i> L.)	Wild Marigold, Mexican marigold	Flowering tops	Colour: Yellow-amber viscous liquid Odor: Fruity, green, herbal fragrance	Tagetone, ocimene, myrcene, linalol, limonene, pinenes, carvone, citral, camphene, valeric acid, salicylaldehyde	Anthelmintic, antispasmodic, bactericidal, carminative, diaphoretic, emmenagogue, fungicidal, insecticide, sedative, stomachic	[10, 12, 14]
79.	Tangerine (Mandarine) oil ( <i>Citrus × reticulata</i> Blanco) [12]	European mandarin, Tangerine, True mandarin	Peel	Colour: Yellowy orange color Odor: Fresh orange mandarin odor	Limonene, methyl methylantranilate, geraniol, citral, citronellal	Antiseptic, antispasmodic, carminative, digestive, sedative, stimulant	[10, 12, 14]
80.	Tea tree oil ( <i>Melaleuca alternifolia</i> (Maiden & Betche) Cheel)	Tea Tree	Leaves	Colour- Pale yellow. Odor- Spicy, warm, terpene, nutmeg-like fragrance	Terpinene-4-ol, cineol, pinene, terpinenes, cymene, sesquiterpenes	Antimicrobial, antiseptic, bactericide, cicatrisant, expectorant, fungicide, insecticide, stimulant	[10, 12, 14]

Table 1. (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
81	Thuja wood oil ( <i>Thuja occidentalis</i> L.)  IUCN status: Least concern (LC)	Thuja, Yellow Cedar	Wood	Colour: Clear yellow to completely colorless  Odor: Sweet Odor	Thujone, fenchone, camphor, sabinene, pinene	Antirheumatic, astringent, diuretic, emmenagogue, expectorant, insect repellent, rubefacient, stimulant	[10, 12, 13, 14]
82	Thyme oil ( <i>Thymus vulgaris</i> L.)  IUCN status: : Least concern (LC)	Thyme	Leaves and flowers	Colour: A red, brown or orange liquid  Odor: A warm, spicy herbaceous, powerful odor	Thymol, carvacrol, cymene, terpinene, camphene, borneol, linalol	Anthelmintic, antimicrobial, anti- oxidant, antiputrescent, antirheumatic, antiseptic, antispasmodic, antitussive, antitoxic, aperitif, astringent, aphrodisiac, hypertensive, nerve, rubefacient, stimulant	[10, 12, 13, 14]
83	Turmeric leaf oil ( <i>Curcuma longa</i> L.)  IUCN status: Data Deficient (DD)	Turmeric	Leaves	Colour: Yellow to slightly yellow- green thin liquid  Odor: Spicy, earthy, warm odor	Tumerone, tumerone, atlantones, zingiberene, cineol, borneol, sabinene and phellandrene	Analgesic, antiarthritic, anticancer, anti- inflammatory, antioxidant, bactericidal, cholagogue, digestive, hypotensive, insecticidal, laxative, rubefacient, stimulant	[10, 12, 13, 14]
84	Vanilla essential oil ( <i>Vanilla planifolia</i> Andrews)  IUCN status: Endangered (EN)	Vanilla	Fruits	Colour: Dark Brown  Odor: Sweet, Vanilla	Vanillin, eugenol, caproic acid	Anticarcinogenic, Antidepressant, Antioxidant, Aphrodisiac, Febrifuge, Relaxing Sedative, Tranquilizing	[10, 12, 13, 14]
85	Valerian root oil ( <i>Valeriana officinalis</i> L.)  IUCN status: Least concern (LC)	Valerian	Roots (Rhizo mes)	Colour: Olive- green clear liquid  Odor: Earthy, woody, slightly sweet scent	Bornyl acetate, isovalerate, valerianol, caryophyllene, pinenes, valeranone, ionone, borneol, patchouli alcohol	Antidandruff, antidepressant, diuretic, antispasmodic, bactericidal, carminative, hypotensive, regulator, sedative	[10, 12, 13, 14]
86	Vetiver oil ( <i>Chrysopogon zizanioides</i> (L.) Roberty)	Vetiver	Roots	Colour: Yellow- brown viscous liquid  Odor: Woody, rooty, balsam odor	Vetiverol, vitivone, terpenes	Antiseptic, antispasmodic, depurative, rubefacient, sedative, stimulant, tonic	[10, 12, 14]
87	Wintergreen oil ( <i>Gaultheria procumbens</i> L.)	Checkerbe rry, Boxberry	Leaves	Colour: Pale yellow to reddish brown  Odor: Sweet Wintergreen odor	Methyl salicylate, formaldehyde, gaultheriline	anti-inflammatory, antirheumatic, antitussive, astringent, carminative, diuretic, emmenagogue, stimulant	[10, 12, 14]

**Table 1.** (Continued)

S. No.	Essential oil (Botanical Name)	Common Name	Parts	Characteristics	Chemical Composition	Pharmacological activity	References
88.	Wormwood essential oil ( <i>Artemisia absinthium</i> L.)	Wormwood	Leaves and Twigs	Colour: Dark Green liquid Odor: An aromatic earthy odor	Thujone, azulenes, terpenes	Anthelmintic, choleric, deodorant, emmenagogue, febrifuge, insect repellent, narcotic, stimulant, tonic, vermifuge	[10, 12, 13, 14]
	IUCN status: Least concern (LC)						
89.	Yarrow essential oil ( <i>Achillea millefolium</i> L.)	Common Yarrow	Flowers	Colour- greenish blue to Dark Blue Odor-Sweet, Herbaceous, & Spicy Tone	Pale Azulene, caryophyllene, thujone, eucalyptol, pinene, borneol	Aphrodisiac, antiseptic, cicatrisant, nervine, tonic, sedative, vulnerary	[10, 12, 13, 14]
	IUCN status: Least concern (LC)						
90.	Ylang ylang oil (Cananga oil) ( <i>Cananga odorata</i> (Lam.) Hook.f. & Thomson)	Ylang Ylang	Flowers	Colour- yellow clear liquid Odor-Fresh, floral, sweet, slightly fruity, fragrant yet delicate	Pale Methyl benzoate, methyl salicylate, methyl benzyl acetate, eugenol, geraniol, linalol, terpenes	Aphrodisiac, antidepressant, anti-infectious, antiseborrheic, antiseptic, euphoric, hypotensive, nervine, regulator, sedative	[10, 12, 13, 14]
	IUCN status: Least concern (LC)						
91.	Hyssop oil ( <i>Hyssopus officinalis</i> L.)	Hyssop	Flower and Leaves	Colour: colourless to pale yellowy-green liquid Odor: Sweet, camphorous odor	A Pinocamphone, isopinocamphone, estragole, borneol, geraniol, limonene, thujone, myrcene, caryophyllene	Astringent, antiseptic, antispasmodic, antiviral, bactericidal, carminative, cephalic, cicatrisant, emmenagogue, expectorant, febrifuge, hypertensive, nervine, sedative	[10, 12, 13, 14]
	IUCN status: Data Deficient (DD)						
92.	Zanthoxylum oil ( <i>Zanthoxylum armatum</i> DC.)	Prickly Ash	Fruits	Colour: yellow to Reddish Brown Liquid Odor: Fresh Sweet Wintergreen odor	Pale a-pinene, sabinene, $\beta$ -myrcene, $\beta$ -pinene, $\beta$ -limonene, $\beta$ -phellandrene, linalool, trans methyl cinnamate	Analgesic, antibiotic, antiseptic, carminative, febrifuge, odontalgic, sedative, stimulant, stomachic, tonic	[10, 12, 13, 14]
	IUCN status: Least concern (LC)						

containing aromatic herbs, resin, barks, leaves, exudates, twigs, roots and seeds, for medicine, beauty aids, cosmetics, and as a deodorant. In Indian religion, incense (Dhupan) was used in worship to offer God. According to Ayurveda, Dhupan is highly beneficial for disinfecting the body or the room because it includes aromatic essential oil which is rich in various biological activities. Scented oils (Sugandh tailas) were used topically to treat various skin disorders. There are some health-protective and disease-eliminating practices in Ayurveda named ‘Abhyanga’ include massage of the body with aromatic oils for healthy, smooth skin; Udvartanam includes massage

with herbal, scented powder to regulate blood circulation and weight loss; Sugandha Paniya includes a sprinkling of scented water on the body. Other ancient literature mentions that the body becomes redolent by drinking scented water of sandalwood, cardamom, usira (vetiver), and tagra (Indian valerian). ‘Varahamihira’ mentioned a scent known as ‘Smaroddipana’ made from leaves of *Cinnamomum tamala* Nees & Eberm (patra), *Tagetes erecta* L. (Turuska), *Valeriana jatamansi* Jones ex Roxb. (Tagara). Also, a scent name ‘Bakula’ is made by fumigation of Smaroddipana ingredients with *Picrorhiza kurroa* Royle ex Benth. (katuka) and



*Commiphora mukul* (Hook. ex Stocks) Engl (Guggulu). *Elettaria cardamomum* (L.) Maton (Ela, cardamom), *Syzygium aromaticum* (L.) Merr. & L.M.Perry (Clove), *Piper cubeba* L.f. (Kakkola), *Myristica fragrans* Houtt. (Jaatiphala), and *Cinnamomum camphora* (L.) J.Presl (camphor) is used as a mouth freshener. Clove oil is used for dental emergencies; turmeric for microbial infection and skin diseases; basil for inflammation and heart diseases and cinnamon to stimulate circulation etc. [11, 15, 16, 23].

This holistic health care system prescribes the usage of different medicated oils for application on the body, with or without massage for providing health benefits and to treat specific indications. While most of the medicated oils are for external usage, certain types of medicated oils that are processed with milk are administered orally also.

Ayurvedic text with properties and uses of the essential oil-

Tailam svayonivattatra mukhyaṁ tīkṣṇaṁ vyavāyī ca. Tvagdoṣakṛdacaḥsuṣyaṁ sūkṣmoṣṇaṁ kaphakṛna ca.

Kṛśānām bṛmhañāyālaṁ sthūlānām karśanāya ca.

Bahuvīṭkaṁ kṛmighnaṁ ca saṁskārāt sarvadoṣajit. (A.Hr.Sū.-5.55-56).

*Vāgbhata* described the properties as: Oil is 'svayonivat' meaning it is similar in properties to the ingredients from which it is obtained. Mainly, oil is sharp and *Vyavāyī* in attribute. It causes skin diseases, is harmful for the eyes, enters in channels of the body due to minuteness, is hot in potency and does not vitiate *Kapha* [26, 29]. *Vyavāyī* means that which spreads in the body quickly or which first spreads into the body and then gets digested. That oil, etc. ingredients are called *Vyavāyī*. 'Oil massage is capable of nourishing the lean person and makes obese person slim. It is more bulk promoting and vermucidal. With specific preparations the oil is capable of alleviating three *Doṣa* [26].

Here, the two qualities of oil are explained-First is that oil makes lean person obese and obese person slim. The reason behind it is that the channels transporting *Rasa*, *Rakta*, etc. *dhātu* in body get constricted. Massage with oil, due to its scraping, minute, easily penetrating properties enters in those channels and opens them. In this way, the contraction of channels is removed and body gets nourished. Due to minuteness, oil on massage enters into the channels of obese people to

remove cholesterol/ fat which makes him/her lean. Oil massage is very useful for all in pre-winter, rainy and Autumn seasons. Hence, this fact is famous in *Āyurveda- Ghṛtād Daśaguṇam Tailam mardne na tu bhakṣaṇe.*' means oil is ten times more beneficial than *Ghṛta* )Clarified butter( for massage but not for consumption orally [30]. The second quality of the oil is that it pacifies all three *doṣa* with special preparation [30]. Oil is naturally *Kaphavāta* alleviating due to hot potency and uncutous attribute. If it is especially prepared with *candana*, etc. cold potency ingredients then it pacifies *Pitta* also. Hence, due to special preparation, it is called *Tridoṣa*.

Properties of oil derived from *Nimba* )Indian margosa(-*Nimbatailam tu nātyuṣṇaṁ krimikuṣṭhakaphāpaham.* *Nimbataila* (Rā.Ni.-15.117).

The oil derived from *Neem* seeds is not very hot in potency. It is vermucidal, treats leprosy and pacifies *Kapha* [27].

Properties of oil derived from *Kośāmra* )Kusum tree(-*Saram kośāmrajaṁ tailam krimikuṣṭhavraṇāpaham.* *Tiktāmlamadhuraṁ balyaṁ pathyaṁ rocanapācanam.* *Ābāḍela* (Rā.Ni.-15.123).

The oil derived from *Kośāmra* is laxative, treats worm infestation, leprosy and wounds; is bitter, sour and sweet. It is a tonic, imparts taste and aids in digestion [27].

Properties of oil derived from *Karpūra* )camphor(-*Karpūratailam radadādharyakāri vātāmayaghaṇaṁ kaṭu pittakāri.* *Kāpurela.*

Oil derived from *Karpūra* )camphor( strengthens the teeth, treats *Vāta* diseases, is pungent in taste and aggravates *Pitta* [27].

Properties of oil derived from seeds of *Khasa* (poppy seed)-

*Tailam tu khasabījanām balyaṁ vṛṣyaṁ guru smṛtam.* *Vātaḥṛt kaphahṛcchītam svādūpākarasaṁ ca tat.* *Khasakhasela* (Bhā.Pra.Ni.-20.21).

The oil derived from the seeds of *Khasa* is tonic, aphrodisiac, and heavy in attributes. It pacifies *Vāta* and *Kapha*, is cold in potency, sweet in taste and has a post-metabolic effect [28].

Importance of utility of oil-

*Tailaprayogādjarā nirvikārā jītaklamāḥ.*

*Āsannatibalā yuddhe daityādhipatayaḥ purā.*

In ancient time, by the use of oils denom kings/chiefs became *Ajara* )devoid of old age(, *Nirvikāra* )devoid of diseases(, fatigue free and most powerful in wars [30].

Tailam na sevayed dhimān yasya kasya ca yad bhavet. Viśasāmyaguṇatvācca yogayogyam na varjayet (Rā.Ni.-15.127).

According to *Rājanighaṇṭu* - A wise man must not use any oil without consulting a physician on his own because oil has properties similar to poison. Hence, according to *Āyurveda* where ever a particular oil is prescribed, there only that oil should be used and not any other oil [27].

Oil is having poisonous effect; it is described as- Viśasya tailasya na kiñcidantaram mṛtasya suptasya tathā na kiñcit.

Ṛṇasya dāsasya na kiñcidantaram mūrkhasya kāṣṭhasya ca naiva kiñcit (Rā.Ni.-15.128).

There is no difference between dead and slept one, debt and servant, fool and wooden lodge similarly in oil and poison, means oil is like poison. So, it should be utilized safely as prescribed [26-28].

According to Ayurveda, a state (increase or decrease) is called 'dosa visamata'. A disturbed state or imbalance state of three doshas (vata, pitta, kapha) is the reason for various diseases [11, 17]. Ancient healing practices have various methods to balance tridoshas, but here, we present an insight into some essential oil-bearing aromatic plants used to pacify three doshas as follows (Fig.1)- Vata dosha- *Angelica glauca* Edgew. (choraka), *Bacopa monnieri* (L.) Wettst. (Brahmi), *Amomum subulatum* Roxb. (Brihat Ela), *Cinnamomum verum* J.Presl (Twak); *Crocus sativus* L. (Kumkum); *Valeriana jatamansi* Jones ex Roxb. (tagara/jatamansi), *Citrus × bergamia* (Risso) Risso & Poit. (bergamot), *Jasminum* sp. (jasmine), *Myristica fragrans* Houtt. (Nutmeg). Pitta dosha- *Coriandrum sativum* L. (coriander), *Foeniculum vulgare* Mill. (Mishreya/ Sweet fennel), *Azadirachta indica* A.Juss.(Nimba), *Rosa × centifolia* L. (rose/taruni), *Lawsonia inermis* L. (Henna), *Pandanus odorifer* (Forssk.) Kuntze (Fragrant Screw Pine/Kewda), *Chrysopogon zizanioides* (L.) Roberty (Vetiver), *Santalum album* L. (sandalwood), *Mentha × piperita* L. (peppermint). Kapha dosha- *Zingiber officinale* Roscoe (ginger/ shunthi), *Juniperus communis* L. (juniper/ hapusha), *Cinnamomum camphora* (L.) J. Presl (camphor), *Ocimum tenuiflorum* L. (basil/tulsi), *Piper cubeba* L.f. (cubeb or tailed pepper/kankola), *Myristica fragrans* Houtt. (Jatiphala), *Acorus calamus* L. (Sweet Flag/Vacha) [11, 18].

### 2.3 Aromatherapy- a holistic healing treatment

Aromatherapy is driven by two words 'aroma' means



Figure 1. Tridosha pacifying essential oils bearing plants

'fragrance' and 'therapy' means 'treatment'. In a literal sense, it means treatment through fragrance. It is a modern name for ancient knowledge of healing practices that used aromatic oil to treat various physical and psychological diseases and disorders. It is quite beneficial to balance, harmonize, and promote good mental or physical health. The use of aromatic parts of plants for good health is an ancient practice and is described in ancient literature. These oils are extracted from various parts of the plants, i.e., roots, stems, bark, leaves, flowers, fruits, and seeds. Aromatherapy only prefers the natural ingredients of plants. There are various types of essential or volatile oils are used in this therapy such as floral oils, herbaceous oil, camphoraceous oils, woody oils, and some spice oils which are rich in various biological activities and beneficial for human health. Inhaling the aroma from these essential oil stimulates the brain and gives psychological benefits. For instance, eucalyptus essential oils help ease congestion, whereas, lemon oil has anti-stress/antidepressant properties used in reducing stress levels. The proper use of this oil matters for better results in health and beauty. These volatile oils are much concentrated and should never be applied directly to the skin. It can be used by mixing it for complex aromas and specific therapeutic benefits. Various products prepared with essential oils are used in aromatherapy such as aromatic perfumes, aromatic creams, aromatic oil, soaps and bath, solutions, etc. There are numerous essential oils available, and each has unique therapeutic characteristics [18-21].

### 3. Conclusions

Essential oils are unique products of plants that boost pharmaceutical and industrial applications in our country. This review provides an overview of essential oils-bearing plants, their principal

components, and their pharmacological activity with Ayurvedic uses. The use of these oils is an ancient practice for physical and psychological health which is mentioned in ancient Vedic literature. After the outbreak of the pandemic, the use of herbal plant products has been rapidly increasing among people from several countries. Our forests and lands are rich in these plants which fulfill the basic needs of the rural community and help promote good health and economy. Nowadays, synthetic essence-based products have become a reason behind numerous diseases, and therefore, an exact knowledge of natural essence source and their properties is essential for the upcoming generation, so that, they are able to identify the original botanical source for a specific component. Conservation and cultivation are also very important points along with the overall knowledge of the uses of these plants. For instance, many aromatic plants such as saffron, musk, sandalwood camphor, chaulmoogra, costus, spikenard, and many others are listed in the red data book of IUCN, resulting in their expensive, original, essence-based product. Awareness about species' status is necessary so that we can protect and maintain our ecosystem. Our scientific community needs to take appropriate actions to maintain its existence in our ecosystem.

### Authors' contributions

Conceptualization, A.B.; Data curation, B.J.; S.B.; Formal analysis, S.B.; Investigation, S.B.; Methodology, B.J.; S.B.; A.S. and R.K.M.; Writing–original draft, S.B.; Writing–review and editing, A.S.

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### Conflicts of interest

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