



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP3: 394-396

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National conference on "Conservation, Cultivation and Utilization of medicinal and Aromatic plants" (College of Horticulture, Mudigere Karnataka, 2018)

Aromatic herbs with essential oils and their antimicrobial property

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Abstract

Aromatic herbs have been mentioned in Ayurvedic classics under certain combinations such as Trijataka, Sugandhi tripala, Panchasughandhika, Mahasugandha of Mishraka gana and they are known for their therapeutic potency since ages. Recent Researchers have also proved their antibacterial, antifungal, antiviral, insecticidal and antioxidant properties. They are widely used in medicines and foods because of their potential therapeutic properties. Aromatic oily liquids called essential oils (also called volatile oils) are obtained from the various parts of plants like leaves, buds, fruits, flowers, twig, bark, wood, roots and seeds. Essential oils and their components show promising activities against many food-borne pathogens and spoilage microorganisms in Ayurvedic formulations when tested invitro. Their synergistic and additive effects provide an overview on the antimicrobial efficacy of this combination. In this review an effort is made to provide an overview on the antimicrobial efficacy of these herbs and their combinations.

Keywords: Aromatic Herbs, Essential Oil, Pharmacological action, Antimicrobial property

Introduction

Essential oils from medicinal and aromatic plants are derived as secondary metabolites from the plants. They are known for their antimicrobial, insecticidal, antiviral and antispasmodic properties. Insecticides and Pesticides play an important role in the increasing the agricultural productivity. With the development and large scale use of synthetic insecticides and pesticides, the human and environmental side effects are also increasing. Consequently there is also growth in the concern about environmental protection, Human health and food safety. In this regard the Botanical insecticides have been found to be more effective alternatively, friendly to the environment as well as to the human health. The use of Plant extracts and products has been found since ages, even from Vrikshayurveda Aromatic plants and their essential oils have been used since antiquity in flavor spice, medicine as antimicrobial and insecticidal agents and also to repel insect and protect stored products ^[1, 2].

Material and Methods

This review has been done with references from the major work on essential oil and their bioactive components. In the treatise Bhavaprakasha Nighantu, plants belonging to especially Karpuradi varga focuses on the aromatic plants and essential oils which are having high medicinal value as well as known for their sustainable use in organic farming.

Table 1: List of aromatic plants having with essential oils of antimicrobial property

S. No.	Sanskrit name	Botanical Name	Chemical constituents	Research Updates
1	Karpura	<i>Cinnamomum Camphor</i>	camphor linalool cineole and 3, 7, 11-trimethyl-3-hydroxy-6, 10-dodecadien-1-acetyl acetate	The essential oil of Camphor wood has natural anti-bacterial function; it is bacteria suppression on <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , <i>Salmonella</i> , <i>Shigella</i> , and <i>Bacillus thuringiensis</i> [3].
2	Jatiphala	<i>Myristica fragrans</i>	β -Pinene, α -pinene, myristicin, isoeugenol, <i>p</i> -cymene, carvacrol, eugenol and β -caryophyllene	Essential oils and volatile constituents of <i>Myristica fragrans</i> (nutmeg) are widely used as Antibacterial Activity antioxidants, antidiabetic agents [4]
3	Agaru	<i>Aquilaria agallocha</i>	alkaloids, anthroquinones, triterpenoids, tannins, fixed oils and fats and glycosides	Aqueous and methanol extracts along with dry powder of leaf and bark of the plant was screened for the presence of phytochemicals. Also they were tested for antibacterial activity against pathogenic bacteria such as <i>Shigella flexneri</i> , <i>Bacillus brevis</i> , <i>Pseudomonas aeruginosa</i> and <i>Bacillus subtilis</i> [5]
4	Twak & Lavanga (Clove)	<i>Cinnamomum zeylanicum</i>	Cinnamyl acetate trans-alpha-bergamotene and caryophyllene oxide	The antimicrobial activity of essential oils (EOs) of cinnamon bark, cinnamon leaf, and clove against <i>Listeria monocytogenes</i> Scott A were studied in semiskimmed milk incubated at 7C for 14 days and at 35C for 24 h. These results indicate the possibility of using these three EOs in milk beverages as natural antimicrobials [6]
5	Chandana	<i>Santalum album</i>	alpha-santalol Z-beta-santalol	Antimicrobial activities of different sandalwood essential oils. antimicrobial activities against the yeast <i>Candida albicans</i> , the Gram-positive bacterium <i>Staphylococcus aureus</i> and the Gram-negative bacteria <i>Escherichia coli</i> , <i>Pseudomonas aeruginosa</i> and <i>Klebsiella pneumonia</i> [7]
6	Ela	<i>Elettaria cardamum</i>	Twenty nine compounds were identified in the cardamom oil – α -terpinyl acetate eucalyptol β -linalool sabinene and α -terpineol	The antimicrobial activity of essential oils against pathogenic (<i>Escherichia coli</i> ATCC 25922, <i>Escherichia coli</i> ATCC 8739, <i>Salmonella</i> sp. (clinical isolate), <i>Staphylococcus aureus</i> ATCC 6538P, <i>Proteus vulgaris</i> G) microorganisms by disc-diffusion method was examined [8]
7	Haridra	<i>Tumernic Curcuma longa/ α-phellandrene</i>	Curcumene and ginger	Inhibition of the oblique growth of <i>Rhizoctonia solani</i> Growth inhibition and larval mortality against <i>Spilosoma oblique</i> [1]
8	Putiha	<i>Mentha spicata</i>	carvone, limonene β -bourbonene cis-dihydrocarveol trans-caryophyllene menthone menthol	Antimicrobial, warding off flies [1]
9	Tulasi (Var.)	<i>Ocimum basilicum</i>	<i>methyl eugenol, methyl chavicol</i>	Antimicrobial, warding off flies [1]

Result and Discussion

Among various plant species, the aromatic plants and essential oil plants hold an important place. On review of all the available literature and research updates it was found that the aromatic and essential oils from the natural products are excellent alternatives to synthetic pesticides because they are known to reduce negative impacts to human health and environment. Subsequently they are known for many industrial applications, perfumery, and cosmetics and now the booming area is the organic farming with the role as botanical insecticides.

These essential oils can be easily extracted by the water vapors, in compared to the fixed lipid oils and resins which are extracted by solvents and alcohol.

The karpura (*Cinnamomum Camphor*), twak (*Cinnamomum zeylanicum*), etc plants mentioned in the treatise of bhavapraksha nighantu are known for their antimicrobial and anti-bacterial effect. Thus they can be used in the preparation of the insecticides. They are known for their fumigant and contact insecticidal activities and the less stringent approval mechanisms for their exploration due to long history of use. These aromatic herbs and essential oils can provide protection compared to the widely used synthetic insecticides.

Essential oils from various aromatic plants have shown important biological effects that include cytotoxicity, photo toxicity, nuclear mutagenicity, cytoplasmic mutagenicity, carcinogenicity and anti-mutagenic properties.

Conclusion

Thus among the alternative strategies, the use of the plants and their extracts as insecticidal agents, appears to be

promising. They induced fumigant, topical toxicity as well as anti feedant or repellent effects. Thus aromatic and essential oils are presently regarded as a new class of ecological products or botanical insecticides for controlling the insect pests and useful for the sustainable organic farming.

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