

IMPACT OF MEDICINAL PLANTS ON HUMAN HEALTH: A CASE STUDY OF KARNATAKA STATE

Pragnya. S. Hangaragi

2nd Year, Bachelor of Ayurvedic Medicine and Surgery (BAMS),
Sri Sri College of Ayurvedic Science and Research, Bangalore – 560 082, Karnataka, India

Email: hangaragiss66@gmail.com

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ABSTRACT

Medicinal plants constitute an important part of the natural environment and agro-ecosystems. Medicinal plants are globally valuable sources of herbal products and they are disappearing at a high speed due to changing climatic conditions and human development activities. The main objective of this paper to know the distribution of the area under cultivation, production and its uses for the medicine to cure many diseases in Karnataka, and to find out the impact of medicinal plant products on human health. Karnataka is one of the immensely potential states for the cultivation of medicinal plants and it is the largest producer of *Ashwagandha* (61.65 %), *Amla* (9.46 %), Sandalwood (9.41%) and producer of other like *Gloriosa superba*, *Ashoka*, *Stevia*, *Aloe vera*, *Tulsi*, Hippali, Neem, Baje, *Brahmi*, *Coleus*, Bael (Belva) and oil like Lemongrass, Citronella, Palma Rosa, Jasmine, Tube-rose and Vetiver in substantial quantities. Due to growing global demand, many important medicinal and aromatic plant species are becoming scarce and some are on the verge of extinction. The availability of vast forest resources in the Western Ghats region of Karnataka, presence of progressive farmers, scientific trading and processing community, willing to share responsibilities and the availability of research and development support from the existing institutions are the strengths for the cultivation of medicinal and aromatic plants in Karnataka in a commercial basis. The variety of medicinal and aromatic plant growth and production should be increased to meet out the demand. Extensively growing medicinal plants are an important tool for environmental pollution purification.

Keywords: Medicinal plants, Biodiversity, Conservation, Cultivation, Demand.

INTRODUCTION

Medicinal and aromatic plants (MAP's) are globally valuable sources of herbal products and they are disappearing at a high speed due to changing climatic conditions and human development activities¹. In

recent years, there has been a tremendous growth of interest in plant-based drugs and pharmaceuticals in the world. The availability of plant-based materials is mainly from natural sources like forests and

wastelands. But, due to the ever-increasing utilization of land for food crops, the devastation of forests and the concurrent indiscriminate exploitation of these crops, their availability from natural sources has declined, on the other hand, the demand for internal as well as for export has been increasing, necessitating the production of medicinal crops on a large scale². There is a need to introduce these crops into the cropping systems which, besides meeting the demands of the industry, will also help to maintain the standards on quality, potency and chemical composition. To create an infrastructure for processing, storage, value addition, area expansion through cultivation and production of genuine quality planting materials, an annual action plan in detail for the year 2018-19 under the Centrally Sponsored Scheme of National AYUSH Mission for the component Medicinal Plants has been prepared by the implementing agency i.e. Department of Horticulture, Government of Karnataka³.

Study Area:

Karnataka blessed with a variety of climatic conditions. It is one of the immensely potential states for the development of medicinal plants. The tropical forests of the Western Ghats and deciduous forests of the Deccan plateau have rich in medicinal plants that have more than 2,500 species of plants. Karnataka has one of the richest traditional medicine cultures in India. Many important and useful species are found here. These are long known for their medicinal properties and these references are available in scriptures. Millions of households, particularly in rural areas, use medicinal plants for self-medication, for preventive purpose, rejuvenating and curative applications. Recognizing this importance, the Government of Karnataka established Medicinal Plant Conservation Areas to promote and regulate the sector for optimizing the benefits to people as well as to ensure sustainable growth.

Objectives:

The main objectives of this paper are:

- To know the distribution of the area under cultivation, production and its uses for the medicine to cure many diseases in Karnataka.

- To find out the impact of medicinal plant products on human health.

Materials and Methods:

To know some of the medicinal plants uses and chemistry used secondary data published by Indian Institute of Horticulture Research (IIHR), University of Agriculture Science and Central Institute of Medicinal and Aromatic Plants (CIMAP), the development agencies like the Department of Horticulture, State Medicinal Plants Board and concerned industries join the hands to form the association for the promotion of medicinal and aromatic plants cultivation, production, supply, marketing, and economy. Simple statistical techniques (percentile method) were used to delineate the medicinal and aromatic plants scenario of growth, development and production quantity in the region.

Analysis of distribution pattern of medicinal plants cultivation:

Karnataka is one of the immensely potential states for the cultivation of medicinal plants and it is the largest producer of *Ashwagandha* (16.65 %), *Amla* (9.46 %), Sandalwood (9.41%) and producer of other like *Gloriosa superb*, *Ashoka*, *Stevia*, *Aloe vera*, *Tulsi*, Hippali, *Neem*, *Baje*, *Brahmi*, *Coleus*, *Bael* (Belva) and oil like *Lemongrass*, *Citronella*, *Palma Rosa*, *Jasmine*, *Tuberose* and *Vetiver* in substantial qualities. Karnataka is blessed with a variety of climatic conditions and the tropical forests of Western Ghats and deciduous forests of Deccan plateau rich in medicinal plant Biodiversity with more than 2,500 species of plants and it is called as “biodiversity hotspot”⁴. Therefore, there is a need for in-situ and ex-situ conservation of medicinal and aromatic crops.

DISCUSSION

In Karnataka state annually more than 2,500 (1,493 in-situ & 1,007 ex-situ) species of medicinal and aromatic plants are growing in 6,53,960 hectares of land. For the present study, the researcher has chosen only 21 major species of medicinal and aromatic plants. The Table -1, depicts the 21 important (16 in-situ species & 5 ex-situ) medicinal and aromatic

plants species uses of different parts of Plants for eradicating / cure of human diseases, growing region and its area in Karnataka state. Out of 2500 medicinal and aromatic species *Ashwagandha*, *Amla*, Sandalwood and Neem species growing areas account for 22.40 percent of total medicinal and aromatic plant areas in Karnataka. These plant species are extensively growing throughout Karnataka state. The coastal and malanad (the Western Ghats or Mid Sahy-

adri Range) and southern districts namely: Bangalore, Tumkur, Kolar, Chick Mangalore, Shimoga, Kodagu, Dakshina Kannada (Udupi, Mangalore), Uttara Kannada (North Canara) and Belgaum have grown plenty of medicinal plants in the savanna forest arrest area. Information on the use of medicinal plants for particular diseases was known by local people, Unani Doctors and elder persons of local areas.

Table 1: Important Medicinal Plants Uses and Cultivated Area and its Distribution in Karnataka State: 2018-19.

Sl No	Medicinal Crop Name	Uses of different parts of Plants for eradicating Or cure of human diseases	Medicinal Plants Growing District	Cultivate Area (Hect.)
1	Aswagandha* (B.N: <i>Withania somnifera</i> (L.) Dunal)	Used for arthritis, anxiety, bipolar disorder, attention deficit hyperactivity disorder (ADHD), balance, obsessive-compulsive disorder (OCD), trouble sleeping (insomnia), tumors, tuberculosis, asthma, a skin condition marked by white patchiness (leukoderma), bronchitis, backache, fibromyalgia, menstrual problems, hiccups, Parkinson's disease, and chronic liver disease.	<u>14 - Districts</u> Gadag, Koppal, Bellary, Raichur, Bagalkote, Vijayapura, Dharwad, Tumkur, Chitradurga, Davanagere, Mandya, Kolar, Bangalore, Chikaballapur.	212
2	Amla* (B.N: <i>Emblica officinalis Gaertn</i>)	It consists of vitamin C, A, iron, and calcium. So it should be consumed by anemic people and patients who are suffering from vitamins and minerals deficiencies. It will be very helpful. Improves Immunity, Hair Care, Reduces Stress, Eye Care, Respiratory Health, Treats Anemia, Blood Purifier Diuretic, and Improve Digestion, Absorbs Calcium, Anti-aging, Improves Mental Functions, Weight Management, and Skin Care.	<u>30 - Districts</u> Throughout Karnataka (All 30 Districts).	120
3	Sandalwood* (B.N: <i>Santalum album</i>)	Used as a fragrance in incense, cosmetics, perfumes, and soaps. Sandalwood oil in India is widely used in the cosmetic industry, infection. Skin diseases, swelling or patches on the skin, inflammation, itching and eczema, cure acne, treatment bronchitis, fever and headache, cardiac tonic, leveling urine flow, cooling effect.	<u>2 - Districts</u> Shimoga, Chickmagalur.	119
4	Gloriosa superb* (B.N: <i>Gloriosa superba</i>)	Treatment of gout, infertility, open wounds, snakebite, ulcers, arthritis, cholera, colic, kidney problems, typhus, itching, leprosy, bruises, sprains, hemorrhoids, cancer, impotence, a nocturnal emission, smallpox, sexually transmitted diseases, and many types of internal parasites.	<u>4 - Districts</u> Uttara Kannada, Udupi, Shimoga, Dakshina Kannada.	65

5	Stevia* (B.N: <i>Stevia rebaudiana</i>)	Possible health benefits of stevia are Diabetes control, Weight loss, Blood pressure, Children's diets, Allergies, Pancreatic cancer, etc.	<u>11 - Districts</u> Bangalore, Kolar, Chikkaballapura, Ramanagar, Tumkur, Chamarajanagar, Mandya, Mysore, Chitradurga, Davanagere, Koppal.	70
6	Ashoka* (B.N: <i>Saraca Asoca.</i>)	The bark of the Ashoka plant is used to prepare cosmetics that help to improve skin complexion. Help Treat Acne, Gynecological Problems, Improve Intellect Skin Complexion, Internal Bleeding, Stomach Swelling and Inflammation, Diabetes and Piles Diarrhea, Removes Kidney Stones and Treats Asthma, Relieve Pain.	<u>4 - Districts</u> Dakshina Kannada, Uttar Kannada, Udupi, Shimoga.	76
7	Aloe vera* (B.N: <i>Aloe vera</i>)	Help heal herpes outbreaks, Fight Athlete's Foot, Swab over blisters for quick relief, an antidote to allergic skin reactions. Replace creams and lotions as a general moisturizer for dry skin. Aloe is fast-absorbing, prevents pesky pimples and treats acne, Soothe Psoriasis, Prevent scarring and stretch marks, etc.	<u>30 - Districts</u> Throughout Karnataka (All 30 Districts)	86
8	Tulsi* (B.N: <i>Ocimum tenuiflorum</i>)	Tulsi tea is a great stress buster and develops resistance against anxiety, tension, and stress. It has a good amount of antioxidants that help to contend free radicals. It is one of the important alternatives to coffee and tea. <i>Tulsi</i> Tea good for vision, respiratory system, boosts your immune system and stamina and maintains blood sugar level.	<u>27 - Districts</u> Throughout Karnataka (in 27 Districts) excluding Udupi, Uttar Kannada, Dhakshina Kannada	61
9	Hippali* (B.N: <i>Piper Longum</i>)	Used to improve appetite and digestion, as well as treat stomachache, heartburn, indigestion, intestinal gas, diarrhea, and cholera. Other uses include treatment of headache, toothache, vitamin B1 Deficiency (beriberi), coma, epilepsy, fever, stroke, trouble sleeping (insomnia) leprosy, extreme tiredness, enlarged spleen, muscle pain, nasal discharge, paralysis, psoriasis, intestinal worms, snakebites, tetanus, thirst, tuberculosis, and tumors.	<u>30 - Districts</u> Throughout Karnataka (All 30 Districts)	32
10	Neem* (B.N: <i>Azadirachta indica</i>)	Used for leprosy, eye disorders, bloody nose, intestinal worms, stomach upset, loss of appetite, skin ulcers, diseases of the heart and blood vessels (cardiovascular disease), fever, diabetes, gum disease (gingivitis), and liver problems. The leaf is also used for birth control and to cause abortions. The fruit is used for hemorrhoids, intestinal worms, urinary tract disorders, bloody nose, phlegm, eye disorders, diabetes, wounds, and leprosy.	<u>30 - Districts</u> Throughout Karnataka (All 30 Districts)	118

11	Baje* (B.N: <i>Acorus calamus</i>)	Used by mouth for different stomach problems, including ulcers, inflammation of the stomach lining (gastritis), diarrhea, intestinal gas (flatulence), upset stomach, and many more.	<u>30 - Districts</u> Throughout Karnataka (All 30 Districts)	21
12	Brahmi* (B.N: <i>Bacopa monnieri</i>)	Used for Alzheimer's disease, improving memory, anxiety, and attention deficit-hyperactivity disorder (ADHD) among many oth-	<u>30 - Districts</u> Throughout Karnataka (All 30 Districts)	45
13	Coleus* (B.N: <i>Coleus scutellarioides</i>)	Used to treat allergies, skin, conditions such as eczema and psoriasis, obesity, painful menstrual periods, irritable bowel syndrome (IBS), urinary tract infection (UTI), bladder infections, advanced cancer, blood clots, sexual problems in men, trouble sleeping (insomnia) and convulsions.	<u>17 - Districts</u> Tumkur, Bidar, Bijapur, Belgaum, Mysore, Uttar Kannada, Mandya, Chitradurga, Tumkur, Kolar, Mandya, Bijapur, Bagalkote, Chikkaballapur, Davanagere, Raichur, Bellary.	37
14	Bael (Belva)* (B.N: <i>Aegle marmelos</i>)	Used for the treatment of tuberculosis, Bael for Gynecological disorders, Bael for Urinary diseases, Bael for Diabetes prevention, Bael for Digestive disorders, Bael for Fever prevention, Bael for Epilepsy, Bael Nutritional facts, Bael for Piles treatment, Bael fights ulcer.	<u>10 - Districts</u> Chitradurga, Tumkur, Kolar, Mandya, Bellary Bijapur, Bagalkot, Chikkaballapur, Davanagere, Raichur,	24
15	Sarpagandha* (B.N: <i>Rauvolfia serpentine</i>)	Used in traditional Ayurvedic medicine in India, mainly for high blood pressure and mental illness, Also, one of the chemicals in Indian snakeroot is the same as a prescription drug called reserpine. Reserpine has been used to treat mild to moderate high blood pressure, schizophrenia, and some symptoms of poor circulation.	<u>6 - Districts</u> Chikkamagalur, Dakshinaka Kannada, Uttar Kannada, Kodagu, Belgaum, Mysore	30
16	Cinnamomum / Cinnamon* (B.N: <i>Cinnamomum Verum</i>)	The bark of cassia is a pungent, sweet, hot herb that stimulates the circulatory system, improves digestion, relieves spasms and vomiting and controls infections. The twigs have been shown to increase perspiration and lower fevers	<u>6 - Districts</u> Uttar Kannada, Dakshina Kannada, Uttara Kannada, Kodagu, Belgaum, Mysore	28
17	Kokum* (B.N: <i>Garcinia Indica</i>)	It is useful as an infusion, or by direct application, in skin ailments such as rashes caused by allergies. Kokum butter is an emollient helpful in the treatment of burns, scalds and chaffed skin. Besides, kokum seeds yield a unique fat used to make ointments, suppositories, lipsticks The fruits are steeped in sugar syrup to make amrut kokum which is drunk to relieve sun-stroke.	<u>16 - Districts</u> Uttara Kannada, Dakshina Kannada, Udupi, Chickmagalur, Shimoga, Kodagu, Mysore, Tumkur, Mandya, Bangalore, Hassan, Shimoga, Belgaum, Davanagere, Dharwad, Bangalore.	43

18	Kalmegh* (B.N: <i>Andrographis paniculata</i>)	Use to Promotes Digestion, Protects the liver and gall bladder, Kills intestinal worms & support intestine, Protect skin from pimples, Reduces swelling and cuts down exudation from capillaries, Fights bacterial activity.	<u>12 - Districts</u> Uttara Kannada, Dakshina Kannada, Udupi, Chickmagalur, Shimoga, Kodagu, Belgaum, Uttar Kannada, D.Kannada, Davanagere, Dharwad, Bangalore.	34
19	Guggal* (B.N: <i>Commiphora wightii</i>)	The extract of gum guggul has been used in Unani and Ayurvedic medicine, for nearly 3,000 years in India. One chemical ingredient in the extract is the steroid guggulsterone, which acts as an antagonist of the farnesoid X receptor, once believed to result in decreased cholesterol synthesis in the liver.	<u>25 - Districts</u> Throughout Karnataka (in 25 Districts) excluding Udupi, Uttar Kannada, D.Kannada, Hassan, Chickmagalur	23
20	Agarwood* (B.N: <i>Aquilaria agallocha</i>)	It helps to increases appetite by acting on gastric juices and liver functions. It helps in abdominal distension and helps to release wind from the intestines. Thus, it also decreases abdominal pain and cramps that occur due to excess gas in the alimentary canal. Traditional Hindu Families also use it for increasing learning abilities and improving memory.	<u>4 - Districts</u> Chikkamagalur, Uttara Kannada, Kodagu, Shimoga	19
21	Red sanders* (B.N: <i>Pterocarpus santalinus</i>)	Used in traditional herbal medicine as an anti-pyretic, anti-inflammatory, anthelmintic, tonic, hemorrhage, dysentery, aphrodisiac, anti-hyperglycaemic and diaphoretic.	<u>2 - Districts</u> Shimoga, Chickmagalur	10
Important above explained 21 Medicinal Plants Cultivated total area:				1,273
In Karnataka State annually more than 2,500 (1,493 in-situ & 1,007 ex-situ) species of medicinal and aromatic plants total growing area is:				6, 53, 960

Note: A total of 2,500 medicinal species are grown in (6,53,960 hectares) Karnataka, out of which 1,493 Species are grown in in-situ sites, remaining about 1,007 species are grown in ex-situ sites. * (Star): symbol denotes the particular medicinal plant uses referred to the respective plant Wikipedia from the internet.

(B.N): Botanical Name of a medicinal Plant.

Source: Directory of Horticulture, Govt. of Karnataka.

The selected 21 (approximately 5% of in - situ species) important common forest medicinal plants (out of 2,500 species 1,493 in-situ species MAP's in Karnataka) are indexed in a uniform system (see Table: 1). This will provide a scientific explanation of the experience generated knowledge. According to the report of the Botani-

cal Survey of India 2011, 3,924 species are belonging to 1,323 genera and 199 families in the forests of Karnataka, of which, 1,493 species are of medicinal value. These belong to 808 genera and 108 families. They occur in different vegetation types across the Western Ghats. The rate of exploitation has also been increasing at a very faster rate and that has caused supply bottlenecks for a few. The medicinal plants are used in the treatment of various ailments of humans and cattle. The rural people of Karnataka state are highly dependent on these medicinal plants as those are easily available and proved to be effective.

Karnataka is one of the leading States that has a significant presence of Ayurvedic and Unani manufacturing companies. The use of Ayurveda as a means of medicine has been growing in the State quite fast.

Some large manufacturers and top-class nature cure centers are in Karnataka. Presently there are 71 Ayurveda, Unani, Homoeopathy and Nature Cure & Yoga Colleges in Karnataka and these colleges add to the number of practitioners every year. Today, many people are engaged in these systems of medicines in the State and the State has its popularity offering nature cure to many diseases. The demand exceeds the supply of medicinal plants in Karnataka. At present, around 90 percent of the supply of the raw material is directly from the forest and mostly from outside the State. Cultivation of a few species began only recently and that meets only about 10 percent of the demand (Govt of Karnataka, Dept. of Horticulture and its annually published reports). Traditionally, the tribes and local communities in and around the forest used to supply medicinal plants from herbal products. There are a few regions that specialize in the supply of specified raw material to industries and practitioners.

In recent years some of the medicinal plants are disappearing, rarely available, extinction by changing physical features, climatic condition, and human development and scientific activities. For sustainable development of a regional government and private agencies are taken a major step to conserve the important disappearing medicinal plant in the nursery for future growth. Medicinal and aromatic plants constitute a major segment of the flora, which provides raw materials for use in the pharmaceuticals, cosmetics and drug industries. The indigenous systems of medicines, developed in India for centuries, make use of many medicinal herbs.

Potentiality

Karnataka is one of the largest producers of essential oils, high-value perfumery products, and food flavors in the Country. It is the largest producer of sandalwood, Bursera and Davana oils, and producer of other oils like Lemongrass, Citronella, Palma Rosa, Jasmine, Tuberose and Vetiver in substantial qualities. Besides, State has also more potential to take up the cultivation of medicinal plants such as Sandal, Ashwagandha, Tulsi, Stevia, Pachouli, Bail, Gloriosa, Aloe vera, Salvia, Amta, Andrographis, Guggal, Acorus, Coleus, etc.

Accessibility

As per the survey conducted under National Horticulture Mission, Department of Horticulture, Government of Karnataka, the total area under cultivation of medicinal plants was 2,420 hectares and annual production was 4,101 million tons. There are more than 55 companies/agencies involved in large scale processing, value addition, and marketing of medicinal products in the State. Besides, there are more than a hundred small scale entrepreneurs involved in herbal formulation and marketing. Important medicinal plants like Sandalwood, Ashwagandha, Tulsi, Coleus, Amla, Safedmusli, Aloe vera, Acorus calamus, Kalmeg, Senna, Mucuna prurita, etc. have been taken up under the Central sponsored scheme of National Mission on Medicinal Plants since inception to till date.

Availability

Need to use of available wasteland as supporting system for growing medicinal plants in Karnataka. Estimates of wastelands in Karnataka are 71.22 lakh hectares of which 4.04 lakh hectare areas are suffering from the problem of salinity and alkalinity and 67.18 lakh hectares is water eroded area. This much of wasteland is available for the cultivation of medicinal and aromatic plantation. Recently medicinal plants are used to prepare many medicines worldwide.

“SWOT” Analysis Of Collection And Cultivation Of Medicinal And Aromatic Plants:

On the basis of discussions with four stakeholder groups, namely: farmers, users, contractors, and processors, we have carried out a brief SWOT (Strength, Weakness, Opportunity, Threats) analysis of the present scenario of the cultivating medicinal and aromatic crops in Karnataka. A SWOT analysis to examine the suitability of the region for cultivation and collection of medicinal plants revealed the following:

Strengths

- Karnataka, blessed with a variety of climatic conditions is one of the immensely potential states for the development of medicinal plants.
- The tropical forests of the Western Ghats and deciduous forests of Deccan Plateau are rich in medicinal plant biodiversity with more than 2,500 species.

- A positive policy of State and Central Governments for the development of medicinal and aromatic plant cultivation.
- Availability of vast forest resources in the Western Ghats, hilly areas and man-made forests, with rich sources of medicinal plants.

Weaknesses

- Inadequate information on International demand and marketing.
- Inadequate post-harvest facilities including drying, packaging, and storage.
- High capital investment for procurement and processing.
- Over-exploitation of natural resources from their wild habitats.
- Inadequate information on international demand and supply.

Opportunities:

- Increasing global demand for plant-based herbal medicines.
- The willingness of private and public sector agencies to promote the export of Agro-medicinal plant products.
- Expanding the market for organic plant-based products.
- The willingness of investors on procurement and processing units
- The international market demand for herbal products is growing at an annual growth rate.

Threats:

- Hidden market agendas.
- Depletion of natural resources at an alarming rate and substitution of substandard raw material.
- Development of extra-legal market mechanisms.
- High fluctuations in market prices and the emergence of usurious contractors.

CONCLUSION

The above-explained medicinal plant species could be taken up for further pharmacological and clinical studies which will be useful in the formulation of novel drugs for treating human diseases. The knowledge of the traditional healers helps in the development of the modern medicinal system. The present records of tra-

ditional information from the Karnataka region where novel knowledge has been generated will not only provide recognition to this knowledge, but it also helps in conservation with providing pharmacological leads for the improvement of human society. The current medicine may exist equal with such traditional practice and herbal medicines have often maintained their popularity for historical and cultural reasons

The Western Ghats of Karnataka State is very potential for the medicinal plant resources for sustainable use for the herbal pharmaceuticals for the management of various health disorders of the local people and surroundings. Today people are going back to traditional medical treatment systems mainly because of their holistic and low-cost treatment with the least side effects. The potential benefits of these herbal medicines have been gaining popularity in the western world by the term "Alternative Medicine", thereby increasing the demand for these medicines to a large extent. Therefore, it is important to conserve the extensively traded medicinal and aromatic plants in its natural habitat or cultivate them under field conditions. The concerned State Government and Private Sector Commercial and Social institutions should extend their helping hands towards extensively growing medicinal plants and its conservation at in-situ areas in Karnataka.

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