JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

# Biodiversity of medicinal plants in Aravalli (Sohna region)

**Ms. Jyoti Singh**
Assistant Professor
Department of botany, Dronacharya government college, Gurugram

**Abstract:** The Aravalli hills of Gurgaon district Haryana have high richness of biodiversity. This necessitates to find medicinal wealth for human use. The aim of this study was to investigate and record medicinal uses of plants by the inhabitants of in and around Aravalli hills in Gurgaon district, Haryana, India. Aravallis ranges are one of the very important features of western part of India which runs from Gujarat to Delhi. It traverses in four states viz., Gujarat, Rajasthan, Haryana and Delhi. Maximum part of Aravallis is confined to Rajasthan. As many as 13 wildlife sanctuaries are confined to Aravallis; 10 in Rajasthan, 2 in Gujarat and 1 in Delhi. As many as 3 protected areas are confined to confluence of Aravallis and Vindhyas, all are in Rajasthan. Forest Department, Rajasthan and Foundation for Revitalization of Local Health Traditions, Bangalore jointly has listed 39 species in the "red list of medicinal plants" from Rajasthan state. As per the exploration of the various reviews and article in this paper, we investigate the Biodiversity of medicinal plants in India as well in a brief over view of Aravalli (Sohna Region).

**Key Word**: Biodiversity, Medicinal Plants, Aravalli, Sohna region

## I. Introduction

Human societies have been in close contact with their environments since the beginning of their formation and used the ingredients of the environment to obtain food and medicine[1]. India has a long history and strong base for Ayurveda, which is the traditional herbal medical system. Herbal plants play an important role in prevention and treatment of human diseases. The word Ethnobotany is structured by combining two Greek words: Ethnos and Botane. Ethnos represents 'people' and Botane means 'herb'. It means that 'the study of people and herbs'. It can be called as study of people and plants (trees, shrubs and herbs)'. This was introduced by Jain[3] that Ethnobotany is 'the study of the utilitarian relationship between human beings and vegetation in their environment which includes its medicinal uses.

Now, Ethnobotany is a well-known branch of Botany having received much attention in the developed countries like USA, UK, France and in several other parts of the world. Indian Vedic literature covers a lot of information relevant to Ethnobotany in which Charaka Samhita appears to be the most important. Various parts of India were covered with dense forests having a large number of medicinal plants. Local people had immense knowledge on various applications of plants. Keeping this in mind, usage of medicinal plants was investigated in some parts of the country. But only a little work has been done in Aravalli hills of Haryana. This covers vast surface having high richness of biodiversity in this area necessitating us to start a number of ethnobotanical investigations and results to be documented. Therefore, documentation of medicinal plants and their usage by local inhabitants of Haryana Aravalli hills is an important issue. The objective of this study was to collect and document information about the medicinal plants used by inhabitants of the hills of Aravalli in and around Gurgaon district, Haryana, India.

Rajasthan is the largest state of the Indian union, occupying an area of about 34.22 million hectares. The state may be divided into many regions like Western arid zone, semi-arid zone, South-eastern zone, Chambal ravines, Aravalli zone and Eastern zone. The most striking geological feature of Rajasthan is the Aravalli mountain range-the one of the oldest folded mountain ranges in the world. Aravallis intersects Rajasthan state end to end diagonally covering about 30% area of the state. This mountain chain is extending from Champaner in Gujarat in the South-west to near Delhi in the North-east for a distance of about 692 km. Within Rajasthan, this range runs from Khed Brahma in the South-west to Khetri in the North-east for a length of about 550 km. The Aravallis are rich in medicinal plants. There are certain features which make southern Aravallis rich in the medicinal and other type of plants. High rainfall, presence of soil layer of varying depth on hill slopes, presence of perennial or semi-perennial streams and water courses, inaccessibility in many pockets owing to towering height, deep valleys and parallel running mountain chains, presence of 'nals' etc. are certain factors which makes ecological conditions of this zone congenial to variety of medicinal plants. Presence of 'nals' is very interesting feature of Aravallis, especially of southern Aravallis. Narrow valleys between two parallelly running mountain chains are called nals in the local dialect. Sometimes a deep fold, present in a hill itself is also called nal. Essentially a nallah or stream or a river is always present in a nal. Stream of the nal may be perennial, seasonal or ephemeral. Most of streams in southern Rajasthan are supporting good riparian forests. Moisture regime becomes better in the nal area. Deposition of eroded soil is seen in the valleys which makes them fertile. A rich growth of plants is seen in fertile valleys. Nals and inner slopes are especially rich in medicinal plants. Aravallian forests and other habitats support many plants species of medicinal value in the state.

## II. Literature Review

**Qureshi, M. H. (2021),** This article gives an idea about the study to reflect on the journey in the realm of the discipline of Geography, which has been academically fulfilling for a man born in a dusty-muddy village of district Sultanpur of United Province (present Uttar Pradesh) 5 years before India got independence. Schooling was a challenge, as a small boy he had to traverse a distance of 7 km daily to reach school through ravines of Gomati and undulating landscape. After completing the senior secondary school at Sultanpur town, he moved to Allahabad University in 1957 and completed graduation and subsequently post-graduation in geography in 1961. Immediately after that, he got an opportunity to serve as a teacher and researcher in the field of geography in a number of prestigious educational institutions namely St. John's College, Agra; University of Jodhpur, Rajasthan; Jawaharlal Nehru University, New Delhi; Addis Ababa University, Ethiopia; and University of Bremen, Germany. The turning point of my academic career was introduction to new teaching and learning methods at JNU in which he was involved beside a teacher as an innovator and interactor. The curriculum involving semester system, continuous evaluation, field-based studies were academically enriching for both the students and teacher. He was fortunate to work with Professor Schwartzberg during the fieldwork around Delhi for demarcation of folk regions in India. The fieldworks carried out by me, including those by post-graduate students under my supervision, gave me an opportunity to understand the rural society and observe the beauty and richness of regional cultures of India. The fieldwork in the mountainous terrains in Jammu and Kashmir revealed many secrets of nature. Similarly, the field surveys unraveled to me the wonders of nature in the form of crater and topography of Chilalo mountain and the culture and agricultural landscape of Ethiopia; and rolling fields of rye and oats and *Haufendorf* rural settlements of Germany.

**Boraiah et al. (2021),** In changing climatic scenario, frequent occurrence of climate aberrations can cause huge loss to agriculture productivity, predominantly under rainfed conditions. Hence, ensuring food and nutritional security to increasing population has emerged as the biggest challenge. With diverse agro-ecologies, Indian agriculture is featured by agro-climatic situations often experiencing drought, frost, hailstorm and heat wave. Therefore, climate resilient crops, livestock and fish can play a crucial role in development of climate adaptation strategies for crop production and efficient management of natural resources. In addition to abiotic stress resilience in these commodities, good management practices can significantly reduce losses due to adverse climate. Persistent efforts have been made by ICAR institutes; State Agriculture Universities, NGO, etc. have resulted in some climate resilient varieties/ hybrids of crops with high yielding ability under various abiotic stress conditions. Adoption of abiotic stress tolerant plants varieties, animal breeds etc. can enhance agricultural productivity per unit of land and per unit of natural resources spent and hence can significantly contribute to sustainable as well as profitable agriculture that can help in improving the economic status of farmers. In this publication, an attempt has been to provide updated information about abiotic stress tolerance in crop varieties, animal breeds and fish breeds released under National Agricultural Research and Extension System (NARES). This compilation may serve as ready reference for the students, academicians, scientists, teachers and farmers interested in management of abiotic stress in agriculture. This can also help in orientation of research programs aiming at improvement of abiotic stress tolerance in crops, animals and fish.

**Singh et al. (2021),** they explored the article on Land, a non-renewable natural resource, which is the central resource for all production systems, which has suffered from different types of degradations over the years leads to land degradation which is caused by biotic and abiotic pressures. An ever-increasing population places enormous demands on land resources. This is particularly acute in India, which has only 2.4 per cent of the world's geographical area but supports over 16 per cent of the world's population. It has 0.5 per cent of the world's grazing area but has over 18 per cent of world's cattle population. These pressures have led to drastic changes in the proportion of land utilised for agricultural activities, urbanisation and industrial development. Approximately 36.70% (120.72 million ha area) of total geographical area in India is under various kinds of land degradation due to water, wind, salt, etc spread all over country. Degraded lands have poor soil depth, presence of high per cent of gravels, boulders, poor water holding capacity, loss of top fertile soil (soil erosion), etc limits its utilization for shallow rooted annual crops, which compels for cultivation of deep rooted hardy fruit species with suitable soil and water conservation techniques like assured input supply, watering, organic manuring, micro-site improvements, micro water harvesting structure, use of liquid fertilizers, etc for assuring optimum productivity of horticultural crops. Hilly regions are more vulnerable to soil erosion than the other states of India due to undulated topography, medium to very steep slopes and poor soil depth. On an average basis, the total soil erosion from the terrestrial land surface of India is estimated at 4.87 billion Mg yr−1. It has been reported that 5334 million tonnes of productive soil are lost every year, out of which major portion is lost from about 80 million hectares of cultivated land in India. In India, average productivity of fruits and vegetables is 13.83 t ha-1 which is much lower than average productivity of USA (28.17 tha-1), Spain (28.0) and Turkey (24.60 tha-1). The average productivity of fruits and vegetables in the country can be enhanced from 13.83 to 27.0 t ha-1 yr-1 by adopting soil and water conservation practices for utilization of waste lands / degraded lands. It has been proved that such a system can reduce soil erosion from 42 to 1.5 tonne ha-1 and can save soil and essential plant nutrients. Water harvesting can be harnessed both for irrigation to fruit plants at critical stages as well as for other purposes. Fruit trees with vegetables as a part of fruit-based land uses provide subsidiary sources of income through livestock rearing and have great scope for the degraded lands or waste lands of India.

**Nagaraj (2019),** There are about 340 thermal springs scattered around different volcanically active regions of India. Cyanobacteria predominate among the algal biota in core zones of these specialized habitats with the colonization of other eukaryotic algae (chlorophytes and bacillariophytes) in the aquatic habitats associated with the outflow, at lower temperatures. Study of these microbes carries both ecological and economical significances. A total of 603 algal taxa were recorded so far from various thermal springs of India. A brief summary of the exploration and survey works carried out so far is presented. Taxonomic documentation of two remote hot springs of Arunachal Pradesh is also provided as an updating to the phyco-resources of these extreme habitats of India.

**Zhu et al. (2019),** Although favour is an essential element for consumer acceptance of food, breeding programs have focused primarily on yield, leading to significant declines in favour for many vegetables. The deterioration of favour quality has concerned breeders; however, the complexity of this trait has hindered efforts to improve or even maintain it. Recently, the integration of favour -associated metabolic profiling with other omics methodologies derived from big data has become a prominent trend in this research field. Here, they provide an overview of known metabolites contributing to favour in the major vegetables as well as genetic analyses of the relevant metabolic pathways based on different approaches, especially multi-omics. They present examples demonstrating how omics analyses

can help us to understand the accomplishments of historical favour breeding practices and implement further improvements. The integration of genetics, cultivation, and postharvest practices with genome-scale data analyses will create enormous potential for further favour quality improvements.

**Meghwal & Dwivedi (2017),** presented an article on Agriculture and allied activities. They show Agriculture and allied activities not only provide livelihood to a large section of population but also play a pivotal role in their lifestyle. Agro-biodiversity is an evolutionary divergent, highly interrelated component of biodiversity dealing with agroecosystem and variation in agriculture related to plants, animals, marine life, insects, microbes, avian species, etc. Environmental, biological, sociocultural and economic factors are responsible for the evolution of diverse agroecosystems. A wide range of variability has been recorded in the distribution; plant habit and types; canopy; earliness; bearing; size, shape and colour of leaves, flowers, fruits, and seeds; and weight of fruits and seeds. It recognizes that agriculture evolved from bioprospecting, selection, and development of a few species from plants and animal kingdoms, to meet human needs of food, fibre, and fuel. All biotic factors related to agriculture, such as plants, animals, fish, reptiles, insects, birds, and microbes are components of biodiversity. Therefore, the conservation, management, and sustainable use of these genetic resources require specific attention.

**Balasubramanian et al. (2017),** presented an article on cultural and environmental diversity. Although science has not left any aspect of the life in the modern society untouched, communicating science with general public effectively is not a trivial task. One of the major barriers for effortless communication between science and society is the complexity of the language of science, which is difficult for the society to comprehend. In India, the zenith of cultural and environmental diversity, where people hold different values for the same resources living in the same community with complicated power structure, reaching the developments of science and technology is highly depended on people who can translate the language of science into a format that is appreciable to the layperson without losing the essence.

## III. Medicinal plants from Aravalli Biodiversity Park

The Aravalli Biodiversity Park (ABP) is being developed on 699 acres of land located at northwest of Vasant Vihar. The area is highly degraded due to past mining and infested with Prosopis juliflora (Vilayati kikar). The biodiversity of Delhi is nearly extinct. The prime objective of ABP is to bring back the lost biodiversity of Delhi Aravallis. The other objective of ABP is to promote of nature education among students and create environment awareness among the public. Medicinal garden Overexploitation of medicinal plants from Aravallis has led to local extinction of many species having medicinal value. The ABP is not only preserving but also multiplying the threatened medicinal plants. The medicinal plant conservatory is also used to promote conservation, education and awareness on the importance of plants in health care system. The Park has more than 240 plant species of medicinal importance. Some notable species are Asthama bel, Brahmi, Gugal, Dardpaat, Rudraksh, Hadjod, Van tulsi, Rakt madar, Nirgundi etc. Conservatory of Butterflies Butterflies and moths render pollination services that make orchards to produce fruits and seeds, crops to produce fruit, vegetables, seeds and grains, and forest plants to produce seeds. To bring back the winged beauties to Delhi, the conservatory of butterfly has been created by planting more than 100 species of host plants of butterflies. The conservatory has more than 100 species of butterflies and moths. The notable species are Red pierrot, Pansies, Tigers, Grass jewel, Migrants, Common rose, Spot swordtail, Blues, Tiger moths, Skippers, Swifts, etc. Showcase of Aravalli vegetation A showcase of Aravalli plant communities including Delhi forest, Rajasthan forest and Gujarat forest communities have been developed in visitors' zone. These communities are the miniature of forest communities which are expanded in vast areas of Aravalli Biodiversity Park. Sacred Grove The area around an old temple has been developed as a sacred grove. All plant species which have religious importance have been planted here such as Ficus, Aegle, Nyctanthes arbor tristis, Sapindus, Madhuca etc. Tree conservatory A tree conservatory of 10 different native trees of Aravalli ranges has been developed in the visitor's zone. The tree species are Boswellia serrata, Sterculia uresns, Lannea coromadelica, Prosopis cinereria, Anogeissus serecea, Pterocarpus, Butea monospermaetc. Nature Reserve zone ABP has a wide range of plant communities ranging from grasslands, shrubland, tropical thorn forest to broad-leaved deciduous forests. About 1000 species native to Aravallis have been ecologically assembled into 35 communities which have become home for many insects, amphibians, birds, reptiles and mammals. Some of the communities are:

(i) Adina – Mitragyna,(ii) Terminalia tomentosa – Holoptelea, (iii) Anogeissus – Butea, (iv) Acacia –

Balanites, (v) Wrightia – Holarrhena, (vi)Sterculia – Boswellia, (vii)Grewia – Carissa, (viii)Rhus –

Lycium, and (ix) Cenchrus – Heteropogon and others.

Many wild fruit yielding shrubs such as Carrissa carandens, Ehretia laevis, Cordia gharaf, Zizyphus sp., Ficus sp. were also planted in association with different forest communities to provide foraging habitat for different animal species. Rangeland ecosystem The rangeland spreads over an area of 150 acres. The grasslands are interspersed with patches of native bushes bearing edible fruits such as Capparis, Carissa, Zizyphusand Acacia woodland and Butea monospermic - Prosopis cineraria dominant communities. Groups of grey partridges, Indian hares, dancing peacocks, Black-breasted weavers, Indian silver-bills and occasionally thirsty jackals and blue bull are common inside the rangelands.

Nature Education Aravalli Biodiversity Park with its unique and beautiful undulating landscape harbouring Aravalli's natural heritage, is a paradise for nature lovers. The Park has network of nature trails passing through the dense recreated forest communities, grasslands and seasonal water bodies. Nature Education at Aravalli Biodiversity Park involves activities to inculcate love for Nature and its Conservation among people, especially the younger generation. Many programmes are conducted to spread the message of nature conservation focusing biodiversity and its benefits if you have around. The primary thrust of all the activities are learning by doing. Park encourages all nature lovers and all those who are interested in observing and learning from nature. This effort is an attempt "How to learn from Nature". The Aravalli Biodiversity Park is the only place in Delhi which provides unique camping facilities to school children for imparting environmental education in natural ambience. A number of schools and colleges of NCT of Delhi have been availing this facility since the inception of this park. Scientists and nature education staff of the park interact with students and expose their first contact with nature, which can start a lifelong interest. It is a hub for conservation education.

## IV. Development of natural conservation zone

In its efforts to conserve the green cover encircling Gurgaon, the Haryana government has designated the Aravalli range around Sohna town as a natural conservation zone (NCZ) in the recently-notified Final Development Plan of Gurgaon-Manesar Urban Complex. The state government has emphasized that the NCZ has been envisaged because Sohna region is covered from the three by the Aravalli's and it's crucial to retain the green cover. The plan has also earmarked an area of about 340 hectares for "Water Recharge Zone" to check the run-off, helping replenish the depleting water table of Gurgaon. As per the development plan, out of the total urban sable area of 5,600 hectares, 1719 hectares are earmarked for residential purpose, 255 hectares for commercial, 1,236 hectares for industrial, and 627 hectares for transport and communication together. An area of 241 hectares has been earmarked for public utilities and 573 hectares for public and semi-public utilities. Open space and green belt would be spread over an area of 949 hectares. The government has also envisaged development of theme hubs - Leisure Hub, Sports Hub and Leather Hub along Kundli-Manesar-Palwal (KMP) Expressway in proximity to Sohna town. The plan has projected 6.40 lakh as the area's population by 2031. In the development plan, the KMP Expressway, which is under construction, is a crucial stretch for future expansion of the region. The KMP Expressway, which is under construction, passes by the southern side of the town. The Dedicated Freight Corridor (DFC) linking Delhi to Mumbai also passes by the south-eastern side of the town. The land for DFC has already been acquired and the HSIIDC has taken about 600 hectares of land for development of an Industrial Model Township (IMT) at Sohna, between Sohna town and KMP Expressway.

## V. Illegal farmhouses razed in Aravalli region

The Department of Town and Country Planning (DTCP) on Monday razed four under construction illegal farmhouses and road network constructed on the Aravalli mountain range at Gairatpur Bas here, officials said. According to the DTCP officials, Gurugram district is an urban and controlled area in which permission is required to be taken from the competent authority before the development of a colony. "The violators were developing an illegal colony without any permission. Besides, they were also planning to extend the colony to further 15 acres of adjacent land as well, as new excavation work for laying down road network was evident at the site, while many trees were also found to be uprooted. Four under construction farmhouse structures were demolished, boundary walls and road network were razed," R.S Batth, district town planner said.

Earlier on June 23, a team of the Municipal Council of Sohna had demolished nine illegal farmhouses built on the Aravalli mountain range at Raisina village of Gurugram. The drive was conducted at nine illegal farmhouses which included a boundary wall, tin shades and pillar. The demolition was carried out under Section 4 of Aravalli Notification which says that these hills cannot be used for any purpose other than a plantation. This was done in compliance with a National Green Tribunal (NGT) order from December 2020, which instructed that all such establishments built on the Aravalli range of Gurugram be razed by January 31. As per a recent forest department survey, there are at least 500 such farmhouses built illegally on Aravalli land in Gurugram, concentrated in areas like Gwal Pahari, Gairatpur Bas, Sohna and Manesar.

## VI. Conclusion

The purpose of this research was to examine and document medical applications of plants by the population of in and around Aravalli hills in Gurgaon district, Haryana, India. Aravallis ranges are one of the extremely major characteristics of western section of India which stretches from Gujarat to Delhi. It passes across four states viz., Gujarat, Rajasthan, Haryana and Delhi. Maximum chunk of Aravallis is restricted to Rajasthan. As many as 13 wildlife sanctuaries are limited to Aravallis; ten in Rajasthan, two in Gujarat and one in Delhi. As many as 3 protected areas are restricted to confluence of Aravallis and Vindhyas, all are in Rajasthan. Forest Department, Rajasthan and Foundation for Revitalization of Local Health Traditions, Bangalore together has identified 39 species in the "red list of medicinal plants" from Rajasthan state. As per the research of the numerous reviews and article in this paper, we attempt to explore the Biodiversity of medicinal plants in Aravalli and specifically in context of Sohna Region.

## References


1. Qureshi, M. H. (2021). Journey in the realm of geography. In Reflections on 21st Century Human Habitats in India (pp. 27-53). Springer, Singapore.
2. Boraiah, K. M., Basavaraj, P. S., Harisha, C. B., Kochewad, S. A., Khapte, P. S., Bhendarkar, M. P., ... & Pathak, H. (2021). Abiotic Stress Tolerant Crop Varieties, Livestock Breeds and Fish Species. Tech. Bull, 32, 1-83.
3. Singh, S. K., Singh, D. R., & Patel, V. B. (2021). Souvenir cum Lead & Oral Paper Abstracts Book. In 9th Indian Horticulture Congress-Horticulture for Health, Livelihoods and Economy (pp. 18-21).
4. Nagaraj, S. (2019). Centre for Advanced Studies in Botany.
5. Zhu, G., Gou, J., Klee, H., & Huang, S. (2019). Next-gen approaches to flavor-related metabolism. Annual Review of Plant Biology, 70(1), 187-212.
6. Meghwal, R. R., & Dwivedi, N. K. (2017). Agro-Biodiversity Collection and Conservation from Arid and Semi-Arid Regions of India. In Emerging Technologies in Agricultural Engineering (pp. 209-229). Apple Academic Press.
7. Gupta, R. K. (2017). Mini review: Thermal algae of India with special reference to Jharkhand.
8. Balasubramanian, D., Watve, M., Ramadorai, S., Kasturirangan, K., Sundar, R. S., Purkayastha, P., ... & Gupta, A. (2017). Communicating science to the common: perspectives of the science communicators from India. In Bridging the Communication Gap in Science and Technology (pp. 279-324). Springer, Singapore.