CONSERVING BIODIVERSITY OF MEDICINAL PLANTS
FROM CENTRAL ARAVALLIS OF RAJASTHAN, INDIA

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ABSTRACT

Plants have been an integral part of herbal medicine since ages. In India, the use of plants for medicinal treatment dates back to 5000 years. The present paper is an attempt to explore the traditional, folk and herbal medicine of the Central Aravalli region of Rajasthan. The Aravalli range possesses enormous floristic and ethnic diversities. The main tribes of the region are Bhil, Meena, Garasia and Kathodi. These tribes use the indigenous flora for various medicinal purposes in their daily life as local people have faith and belief in these medicines. The present paper highlights some of the potential medicinal plant species that are used as traditional herbal remedies by the tribal people. Ethnobotanical information about medicinal plants is given by mentioning their botanical name, family, local name, ecology and uses. The present study revealed that economically and medicinally important plants of the study area are facing pressure due to uncontrolled harvesting, overexploitation, premature harvesting, overgrazing, burning etc., because of which few of them have become rare, threatened and endangered. Hence, scientific management is of prime importance today. Conservation strategies must include Identification and utility of these plants and compilation of a database. It is realized in the present study that community based efforts have to be made in order to raise awareness amongst local rural and tribal people of the Central Aravalli hills about the importance and conservation of these valuable taxa.

Key Words: Ethnobotany, Aravalli hills, Medicinal Plants, Conservation strategies, WHO

INTRODUCTION

Herbal medicine or traditional medicine is one of the oldest continuously surviving traditions, which has been practiced to maintain good health and treat diseases in the local community. It is being defined by WHO (2002) as The sum total of health knowledge, skills and practices based upon theories, beliefs and experiences indigenous to different cultures used in the maintenance of health.

The use of herbal medicine is an integral part of Ethno-botany. Ethno botany encompasses many fields including botany, biochemistry, pharmacognosy, toxicology, medicine, nutrition, agriculture, ecology, evolution, sociology, anthropology, linguistic, history and archeology. Ethnobotany is the study of the relationship between plants and people. Harshberger defined Ethnobotany as The study of the utilitarian relationship between human beings and vegetation in their environment, including medicinal uses. The uses of these ethno-medicinal plants are due to easy availability, no side effects, similar to allopathic drugs in relief and their awareness among local people.

STUDY AREA

The study was carried out in the Central Aravalli region of Rajasthan. Rajasthan, which is the largest state of India, located in the north-western part of India. Geographically it lies between 23°30' to 30°12' North latitude and 69°30' and 78°17' East longitude (Fig. 1)
The Aravalli range which is the oldest range of folded mountains in the world has an altitude of 100 to 350 m above sea level and extends from Khetri in north east to Khed Brahma in south west, a length of about 550 km. The selected area is particularly well suited to such a study, as it has high endemic plant diversity. The region also provides an interesting case study because of its topographic complexity, variability in climate, edaphic conditions.

Aravallis possesses enormous floristic and ethnic diversities associated with its cultural heritage and indigenous knowledge about medicinal plants and their utilization to cure various human ailments. The main tribes of the region are Bhil, Meena, Garasia and Kathodi. These tribes have developed over the ages ways to cure various diseases and combat natural disasters.

The tribes and remote villagers are living very close to vicinity of natural diversity. They have their own traditional knowledge on health care, edible, agriculture and cultural practices.

**Fig. 1**: Map of Rajasthan state (India) showing the study area

**MATERIAL AND METHODS**

In the present study, several field trips were undertaken in different tribal regions of the study area during the year 2008-2010, to collect information on medicinal plants. The collected herbal plants were identified up to genus level from flora of Shetty and Singh (1993)\(^7\). Persons possessing the information about the medicinal
plants, villages and family headman, elders, users, and collectors from the villages were consulted and interviewed to gather the information. The data were collected by discussions, observations and cross checking at different places among various tribes and rural people.

RESULTS AND DISCUSSION

The plants are arranged alphabetically, each by its botanical name, followed by name of the family and local names. The medicinal uses are described with details of part(s) used. (Table 1)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Scientific names</th>
<th>Family</th>
<th>Local name</th>
<th>Plant part used</th>
<th>Name of disease(s)</th>
<th>Ecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Abrus precatorius</td>
<td>Fabaceae</td>
<td>Gumchi</td>
<td>Leaves, Root, Leaves</td>
<td>Skin disease.</td>
<td>Wasteland</td>
</tr>
<tr>
<td>2.</td>
<td>Acacia nilotica</td>
<td>Mimosaceae</td>
<td>Babool</td>
<td>Gum, Leaves, Stem</td>
<td>Diabetes</td>
<td>Scrub fores</td>
</tr>
<tr>
<td>3.</td>
<td>Ailanthus excelsa</td>
<td>Simaroubiaceae</td>
<td>Ardu</td>
<td>Leaves</td>
<td>Bronchitis</td>
<td>Wasteland</td>
</tr>
<tr>
<td>4.</td>
<td>Ampelocissus latifolia</td>
<td>Vitaceae</td>
<td>Tita</td>
<td>Wholeplant, tubers</td>
<td>Dyspepsistubercolus</td>
<td>Forest undergrowth</td>
</tr>
<tr>
<td>5.</td>
<td>Argemone mexicana</td>
<td>Papaveraceae</td>
<td>Plikatel</td>
<td>Leaves, Latex</td>
<td>Ulcers, leprosy</td>
<td>Roadside wasteland</td>
</tr>
<tr>
<td>6.</td>
<td>Balanities aegyiaca</td>
<td>Simaroubiaceae</td>
<td>Hingota</td>
<td>Fruit</td>
<td>stomach</td>
<td>Scrub forest</td>
</tr>
<tr>
<td>7.</td>
<td>Boerhavia difusa</td>
<td>Nyctaginaceae</td>
<td>Punernava</td>
<td>Leaves</td>
<td>Strangury, lumbago</td>
<td>Wastelands roadside</td>
</tr>
<tr>
<td>8.</td>
<td>Boswellia serrata</td>
<td>Burserceae</td>
<td>Salar</td>
<td>Root, Gum, Bark</td>
<td>Dysentery, arthritis</td>
<td>On dry hills</td>
</tr>
<tr>
<td>9.</td>
<td>Cayratia trifolia</td>
<td>Vitaceae</td>
<td>Kkhatanima</td>
<td>Root, Tubers</td>
<td>Skindiseases</td>
<td>Wasteland</td>
</tr>
<tr>
<td>10.</td>
<td>Ceropegia bosa</td>
<td>Asclepiadaceae</td>
<td>Khadula</td>
<td>Seed, Tubers</td>
<td>Inflammation in urinarytract</td>
<td>Rocky habitat</td>
</tr>
<tr>
<td>11.</td>
<td>Ceropegia tuberose</td>
<td>Asclepiadaceae</td>
<td>Khadia</td>
<td>Tuber</td>
<td>Animalbite</td>
<td>Rocky habitat</td>
</tr>
<tr>
<td>12.</td>
<td>Citrullus colocynthis</td>
<td>Cucurbitaceae</td>
<td>Tumbo</td>
<td>Pulp</td>
<td>Mental disorder</td>
<td>Sandy habitat</td>
</tr>
<tr>
<td>13.</td>
<td>Corallocarpus epicaeus</td>
<td>Cucurbitaceae</td>
<td>Mirchia Kand</td>
<td>Fruit, Tubers</td>
<td>Typhoid, dysentery</td>
<td>Sandy, habitat gravelly</td>
</tr>
<tr>
<td>14.</td>
<td>Crotalaria burhia</td>
<td>Fabaceae</td>
<td>Shino</td>
<td>Root</td>
<td>Rheumatism</td>
<td>Dry sandy habitat</td>
</tr>
<tr>
<td>15.</td>
<td>Solanum surattense</td>
<td>Solanaceae</td>
<td>Pasar kateli</td>
<td>Leaves, Pulp, Fruit</td>
<td>Anorexia, leprosy</td>
<td>Wastelands, road side</td>
</tr>
<tr>
<td>16.</td>
<td>Tribulus terrestris</td>
<td>Zygophylaceae</td>
<td>Kanti</td>
<td>Fruit, Whole plant</td>
<td>Anorexia, cardiopathy</td>
<td>Roadside, waste places</td>
</tr>
<tr>
<td>17.</td>
<td>Urginea indica</td>
<td>Liliaceae</td>
<td>Koli Kanda</td>
<td>Leaves, Tubers</td>
<td>Respiratory trouble</td>
<td>Wasteland open forest</td>
</tr>
<tr>
<td>18.</td>
<td>Withania somnifera</td>
<td>Solanaceae</td>
<td>Asvagandha</td>
<td>Root, Leaves</td>
<td>Rheumatism, dysentery</td>
<td>Dry wasteland</td>
</tr>
<tr>
<td>20.</td>
<td>Xanthium strumarium</td>
<td>Asteraceae</td>
<td>Raktapuspi</td>
<td>Fruit, Root, Leaves, Seed oil</td>
<td>Eczema, Malaria</td>
<td>Wasteland</td>
</tr>
</tbody>
</table>
The semi arid region of Central Aravalli has great potentiality both from the economic and medicinal point of view. During the study it was revealed that:

Seeds of *Abrus precatorius* are anthelmintic and used for cold, cough, skin disease and loose motion. Roots are useful in Bronchitis, nervous disorder and as blood purifier. Leaves are used for external wounds.

Bark of *Ailanthus excelsa* is used as abortifacient, cough and cold, bronchitis, fever and on wounds. *Argemone mexicana* is used in Anthelmintic and Chronicopthalmia. Root of this plant is used for dog bite and as a mouth wash and latex used for eye trouble, leaves are used for treating ulcers, leprosy, ring warm and in jaundice.

*Boerhavia diffusa*, the whole plant has its medicinal importance. It is useful in all types of inflammations, strangury, leucorrhoea, ophthalmia, lumbago, myalgia, scabies, cardiac disorders, jaundice, anaemia, dyspepsia, constipation, stomachache, cough, bronchitis.

The bark of *Boswellia serrata* is used as tonic, it is good for vitiated conditions of asthma, dysentery, ulcers. The gum resin is astringent, antipyretic, antisympathetic, diaphoretic and diuretic. It is useful in fever, convulsions, orchipathy, chronic laryngitis and arthritis. Leaves are used in eye diseases and on wounds. Seeds are used for growth of hairs.

The plant of *Solanum surattense* acts as appetizer, sudorific, febrifuge, diuretic. It is useful in dental caries, constipation, anorexia, leprosy, skin diseases, hypertension, cough, asthma, bronchitis cardiac disorders. The leaves are used in diarrhea, nervous disorder. Fruits are helpful in eye infection and hydrophobia.

The roots and fruits of *Tribulus terrestris* are cooling, anthelmintic. They are useful in anorexia, cardiopathy, anaemia, ophthalmia, odema in head, fever and general weakness. The leaves are astringent and diuretic. The seeds are strengthening and are useful in haemorrhages and ulcerative stomatitis.

The leaves of *Wrightia tinctoria* are hypotensive and are useful in odontalgia and hypertension. The bark and seeds are astringent, digestive, constipating and anthelmintic.

The latex of bark and unripe fruit are used by tribes for coagulating and solidifying milk.

The herb *Xanthium strumarium* is reputed as a medicine in Europe, China and America. The drug is credited with powerful diaphoretic properties. The dose of half to one ounce is recommended in chronic malaria, leucorrhoea and urinary diseases. Leaves are used in eczema and leucoderma.

Fresh crushed tuber of *Ampelocissus latifolia* is boiled in *Ricinus communis* oil and then applied externally for the treatment of gout. Crushed tuber is given to animal to cure fractured bone. The extract of tuber is given orally to cure dyspepsia and indigestion. Extract of tuber is used in tuberculosis. Infusion of whole plant is used as tonic by aged person. Mixture of *Urginea indica* and *Ampelocissus latifolia* are used for diseases related to respiratory tract like cough, cold, asthma etc.

The dried powder of tuber of *Withania somnifera* is given to check constipation. One teaspoon full of root powder is given in rheumatism. Plant is used by tribals to cure various ailments like, dysentery, abdominal pain, indigestion, etc.

Leaves of *Urginea indica* are cooked as vegetable. This plant act as indicator of rain. If the growth of this plant is full it is an indication of heavy rain ahead. If this plant dried earlier it is the indication of low rain or famine ahead. Decoction of tuber is taken orally to cure respiratory trouble. The plant is used against nematodal infection which is common among tribal people due to absence of proper hygiene.

Powder of *Ruellia tuberosa* is given with milk for checking abdominal pain after delivery.
The petiole and rhizome of *Nelumbo nucifera* is cooked as vegetable and often sold in market by tribal.

Extract of tuber of *Cayratia trifolia* along with infusion of *Trifolium* seed is given orally to diabetic patients to check sugar level of blood. Paste of tuber is helpful in case of snake bite. Powder of tuberous root is taken orally for the early recovery for fractured bone. The plant also has antidote property. Skin diseases like cuts, burns, wounds are cured by this plant.

The decoction of tuber of *Corallocarpus epigaeus* is given to patient in case of typhoid. The tuber of this plant along with fruit of *Citrus medica* is chewed in stomachache. Plant is also used by tribals to cure ailments like, constipation, dysentery, indigestion, etc. The plant proves useful in curing skin diseases like wounds, tumors, boils, sunburn, cut, injury.

The tuber of *Ceropegia tuberosa* is eaten either in raw form or in cooked form. It is helpful in treating bite of poisonous animal, when the powder of tuberous root is applied over the infected area to prevent the poisonous effect of the animal. *Ceropegia bulbosa* is an excellent medicine for stones in urinary tract, bladder, kidney and inflammation in urinary tract. The paste of seeds is dropped in the ear to cure deafness. The tuber is eaten either in cooked or raw form.

*Crotalaria burhia* is useful in kidney pain. Fruits of *Citrullus colocynthis* is used in case of mental disorder and Rheumatism. *Cleome viscosa* is used for curing ulcers, wounds, fever and plague.

Fruits of *Balanities aegyptiaca* are purgative and anthelmintic. Leaf decoction is used for washing hairs to avoid lice. The plant part is used for stomach also. *Acacia nilotica* is anti-diabetic and is useful in cuts, wounds, ulcers, toothaches etc.

Apart from medicinal importance, certain plants have nutritive value also; these are being cultivated by tribal. These include: *Ceropegia bulbosa*, *Ceropegia tuberosa*, *Momordica dioic*, *Nelumbo nucifer*, *Urginea indica*.

There are few important plants, which due to huge medicinal value are over exploited, and now have become rare and endangered; few such plants are *Ceropegia bulbosa*, *Ceropegia tuberosa*, *Corallocarpus epigaeus*. They are facing the threat of extinction if proper care is not taken (Table 2 and Fig. 2).

<table>
<thead>
<tr>
<th>S/N</th>
<th>Scientific names</th>
<th>Family</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Ceropegia bulbosa</em></td>
<td>Asclepiadaceae</td>
<td>Vulnerable plant</td>
</tr>
<tr>
<td>2.</td>
<td><em>Ceropegia tuberosa</em></td>
<td>Asclepiadaceae</td>
<td>Vulnerable plant</td>
</tr>
<tr>
<td>3.</td>
<td><em>Corallocarpus epigaeus</em></td>
<td>Cucurbitaceae</td>
<td>Vulnerable plant</td>
</tr>
<tr>
<td>4.</td>
<td><em>Citrullus colocynthis</em></td>
<td>Cucurbitaceae</td>
<td>Vulnerable plant</td>
</tr>
</tbody>
</table>
CONCLUSION

The present study revealed that wild plants of the Central Aravalli hills used for medicinal purposes are facing severe future threat because of over-exploitation/uncontrolled harvesting. Due to their medicinal importance endemic flora are receiving ever-increasing attention from the scientific community and commercial enterprises also. It is the uncontrolled harvest by drug manufacturers especially in areas near settlements and pastures which is the reason for their decrease in number.

Apart from proving a support in medicinal field, these species continue to help indigenous and local communities in their livelihoods, as people living in these areas have low agriculture productivity which further add to their uncontrolled harvesting (overexploitation, premature harvesting etc.), overgrazing, burning etc.

Another reason for their disappearance is the vigorous competitions with alien weeds and effects of plant pests and diseases have also been sources of threat to several native plants. *Parthenium*, *Eichhornia* and *Lantana* are some familiar examples of exotic plants adversely affecting our native flora.

Therefore, conservation and protection of medicinal plants from exploitation by domestic and...
foreign commercial interests should be the top priority as disappearance of these plant species in such regions may be an irreversible loss from a socio-economic and scientific point of views.7

RECOMMENDATIONS

The present study revealed that the indigenous flora of Central Aravalli has great medicinal potentiality, but on account of many factors the present status of the economically and medicinally important plants are facing the threat of disappearance.8,9 Hence, scientific management is of prime importance today.

An important prerequisite for proper utilization of these ethnobotanical plants is the scientific survey of such highly productive area and the preparation of an inventory. It is necessary that we should have full knowledge regarding the occurrence, frequency, distribution and phenology of various plants for their proper utilization.

Identification and utility of these plants and compilation of a database on local information is required.

Indigenous peoples are carriers of ancestral knowledge and wisdom about local biodiversity. Therefore, participation of them is essential to conservation efforts. Modern science, or government policies, in isolation, can never achieve full success.10-11 It is essential to have a comprehensive approach with a blend of scientific principles with full participation of various stakeholders. By engaging local people long-term strategy can be formulated for conservation of threatened ecosystems. Therefore, there is a great need to create awareness among the indigenous communities about endangering medicinal plants.

Local cultivation of rare medicinal plants and other economic species can also play an important role in their conservation.

The following strategies have been suggested for the conservation of indigenous medicinal plants:

1. Control of overexploitation.
2. Establishment of nature reserves in areas of special national importance.
3. Establishment of ethno forestry.
4. Cultivation of rare and endangered medicinal species.
5. Collection and preservation of germplasm in the form of seed, pollen, tissue or gene bank.
6. Awareness creation on the utility and conservation of medicinal plants to local communities.
7. Legislation for conservation.

REFERENCES