

Botanical Survey of Thar Desert in Barmer District of Rajasthan, India

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ABSTRACT

The District Barmer belongs to state Rajasthan which is important part of Thar Desert. This region contains a number of endangered and vulnerable medicinal plants used as drugs and medicines in pharmaceutical industries. Ethno-medicinal plants of this area are used to treat and cure various diseases. We have collected the information through survey in region of Barmer. Local communities and villagers of Barmer District as *Kalbelia*, *Lohar*, *Jogi*, *Ojha*, *Nath*, *Bheel*, *Bhopa*, *Baba*, *Bhagda*, *Mangniyaar*, *Langa*, *Banjara* and *Raika* are there. They have huge knowledge of ethno-medicinal plants that are used in their daily life. Diminishing of plant species of this Thar region is because of anthropogenic activities. This study mainly focuses on survey, conservation, awareness, of ethno-medicinal endangered plants. Currently requirement of legal documentation and record of ethno-medicinal traditional knowledge, it will be useful in making new drug discovery in the future.

Figure : 00

References : 28

Table : 01

KEY WORDS : Diseases, Ethno-medicinal plants, Medicinal uses, Tribes

Introduction

Ayurvedic medicines are healthy lifestyle system for people in India who have been using for 5000 years. In Ayurvedic literature medicinal plants are wide-ranging fields which explore in whole earth. In *Shloka* there is no man on this earth who is incompetent and there is no plant that is of no medicinal use means approximately all plants contain medicinal value for health against many harmful diseases. Overexploitation of medicinal plants (used in pharmaceutical industries) results into destruction of natural populations of medicinal flora. Indian medicinal plant species have been overexploited for therapeutic uses and have subsequently been placed today in rare and endangered categories.

Rajasthan

Rajasthan State is having unique bio-geographic zones *i.e.* arid and semi-arid zones with some endemic biodiversity, so this study was proposed for conservation of endemic important medicinal plants especially in region of Barmer District by applying biotechnological aspects. The high temperature, low rainfall, low humidity, windstorms and less than 200 mm average rainfall are the normal climatic conditions in the Western Rajasthan desert¹. Rajasthan desert arid zone is providentially gifted with 628 species belonging to 352 genera and 87 families. about one- fourth of the total plants of India Thar desert is useful for the welfare of human beings and animals as food, fuel, fodder, medicine and other requirements². Thar

Desert is rich in plants diversity compared to the other deserts of the world. The local tribal people live in distant areas of arid zone of Rajasthan and are dependent on indigenous knowledge system of medicine for their health care as it is difficult for them to get modern medical facilities for their day-to-day health problems. The traditional healers and tribal local people of arid zone have a rich knowledge of traditional plant-based medicines. To preserve this valuable knowledge, there is a need for documentation of this diminishing knowledge². This work attempts to assess the current status of knowledge of medicinal plant resources of the Barmer District. It also focuses on the importance of documenting traditional knowledge and practices related to conservation and sustainable utilization of medicinal plants. Further ethno-medicinal plants will be investigated for pharmacological activity, based on ethno therapeutics being practiced by tribals for their safe use after clinical trials.

Study Area

Barmer District

This district is spread across an area of 28,387 km². Barmer district is the third-largest district of Rajasthan State. This district is famous for its vegetation like Khejari, Ber, Ker, and their products Peelu, Paka, Chaptiya and Sangari *etc.* It is located between 24°58' and 26°32' N and between 70°05' and 72°52' E. The district forms a part of the Thar Desert and is situated in the western part of the State²³. District Barmer shares border with

TABLE-1 : Some endangered ethnomedicinal plants of Barmer Region

| S. No. | Name of plant | Local name | Ethno medicinal value |
|--------|--|--|--|
| 1. | <i>Aristolochia bracteolata</i> (Aristolochiaceae) | Hukka bel, worm killer | An infusion of plant used in anthelmintic, purgative, anti inflammatory and antipyretic properties. Root paste useful in round worm, trypanocidal effect. Uses in emetic and against breast disease. Leaves and roots are used to ride the body of Guinea worm. Paste of roots used in colic, amenorrhea. |
| 2. | <i>Aerva javanica</i> (Amaranthaceae) | Desert booi, desert cotton, kopak bush | Plant seeds used in headache. Treat toothache. Plant has Nephro-protective, anti rheumatism, anti urolithiatic, anthelmintic activities. Callus extract has anti cancerous activity (breast cancer). Extract has antioxidant property to cure wound infection. |
| 3. | <i>Calligonum polygonoids</i> (Polygonaceae) | Phogro, phog | Plant extracts treat Alzheimer's disease and inhibition of Krait snake's venom. Plant has anti oxidant; antifungal and cytotoxic activities inhibit opium effect and show cooling effect. Flower buds extract are used in sun stroke. |
| 4. | <i>Calotropis procera</i> (Asclepiadaceae) | Aakda, Aak | Used to treat boils and wounds show potential antioxidant and antibacterial activities ⁵ . |
| 5. | <i>Cardiospermum helicacabum</i> (Sapindaceae) | Kapal-phori, gandio, balloon vine, balloon plant, kan futi. | Used to increase hair growth, treating rheumatism, piles, nervous disorders and sprains. Their juice cures earache. Root used against diuretic and laxative. Use as antidote against snake and scorpion bite. Uses regulation of the menstrual cycle. ² |
| 6. | <i>Cistanche tubulosa</i> (Orobanchaceae) | Bhampore, Oont-bagra, Jogido | Plant is used to cure fertility problems in male and female. Decoction of plant is used against jaundice. Treatment of whooping cough, stomach aches etc. ⁶ |
| 7. | <i>Clerodendrum phlomoids</i> (Convolvulaceae, Lamiaceae) | Arni | This whole plant is one of the DASMULA which contains ten different types of roots and used in aromatic, acrid, astringent, cardio-tonic, and carminative. Root extract used in gonorrhoea and cure stomach, swelling in cattle. Extract of leaves are used against fever, colic-pain, and urinary inflammations. |
| 8. | <i>Evolvulus alsinoides</i> (Convolvulaceae) | Phooli, sankhpuspi, vishnnkranti | Plant extract have anti-oxidant, anti diabetic, antimicrobial, chemo protective, brain tonic medicine, against fever, cough, cold, venereal disease and anti cancer activities, memory enhancement and also has immunomodulatory properties. Their ingredients are used for treating the bleeding in uterus, gastric ulcer and also promote hair growth. |
| 9. | <i>Grewia tenax</i> (Malvaceae) | Gangren, Gondni | Fruits play a key role in refreshing drink in hot summer. Plant parts are used in antitumor, aphrodisiac, free radical scavenging activities, and mild antibiotic activities against stomachs, skin and intestinal infection, cough, fever, diarrhoea, dysentery, jaundice, rheumatism etc. Fruit powder treats bone fracture and swelling. Root and fruit are useful in osteoporosis, tissue and wound healing. Local people use leaves and twigs for treating trachoma tonsillitis infection and swelling. |

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| 10. | <i>Maytenus emarginata</i> (Celastraceae) | Kankaro, Malkangni, Vikantala | Plant extract is used as insect repellent and insecticide, cure ailments of stomach, in piles, ulcer and corneal opacities fever, rheumatism arthritis and anti bacterial activity, anti bacterial activity, hepato-protective activity which protect liver. Decoction of leaves used as anti inflammatory. Stem and leaf extracts have antioxidant activity. Paste of leaves is used in treating jaundice. Fruits are sweet, digestible, cooling and blood purifying. |
| 11. | <i>Mollugo cerviana</i> (Molluginaceae) | Chirio ro khet, thread stem carpet weed | Plant extract has activities like antimicrobial, anti-inflammatory, antioxidant, spermicidal, hepato-protective efficiency and photo protective capacity against fever, Stomach ache, jaundice, gout and rheumatism. Plant extract is used for blood purification and applied externally on body. |
| 12. | <i>Neurada procumbens</i> (Roseaceae / Neuradaceae) | Chapari, sand button | Use in heat stroke during summer season. Plant extract is also used to increase the blood pressure.\ |
| 13. | <i>Peganum harmala</i> (Zygophyllaceae/ Nitrariaceae) | Harmal, Gandhiyo, Wild rue | Mostly parts are used to treat hypertension, nervous system problems; like Parkinson's disease and cardiac diseases. Extract of the seeds have antispasmodic, anti cholinergic, antihistamine and anti adrenergic properties. The smoke of plant is given to relieve in toothache and useful in asthma. Seeds are used in treating jaundice, fever, colic pain, hysteria and rheumatism. Root paste is used to kill lice in hairs. |
| 14. | <i>Pergularia daemia</i> (Asclepidaceae) | Gadaria ri bel, trellis-vine, hair knot plant | Traditionally the whole plant is used as a laxative, antipyretic and expectorant activity against infantile diarrhoea, malaria intermittent fever, toothache, cold, control blood pressure and uterus contraction. The leaves and stems are considered aperitif, anthelmintic, ammenagogue and are used in fainting, dysentery, colic, rheumatism, painful joints and limbs, cramps in the legs, malaria, appendicitis, amenorrhoea, neural disease and tachycardia arising from overexertion, uterine and menstrual problem. |
| 15. | <i>Portulaca oleracea</i> (Portulacaceae) | Luni, kulfo | The stem leaves and flower buds are edible which treat scurvy (deficiency of vitamin C) and diseases of liver, kidney, spleen and bladder. Fresh juice of leaves is used in thirst diminishes and increase cooling effect in body. |
| 16. | <i>Salvadora spp.</i> | Arak, Jhak, Pilu, mustard tree, khari jaal, Toothbrush tree, miswak | Seed extract is used in detergent oils. Decoction of leaves is used to decrease fatal death in uterus, cooling agent, and blood purifier, laxative, expectorant, purgative in horses, inflammation of legs for wound healing and its extract is beneficial to relief in abdominal pain in new born babies. The leaves are sand binders and good fodder for goats, cows and camels. ⁹ |

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| 17. | <i>Sarcostema acidum</i> (Asclepidaceae/ Apocynaceae) | Khir-khimpadi, soma, somlata, moon plant | The plant is used- fight against pitta, dipsia, viral infection, hydrophobia, psychopath and general debility. Roots as antidote of snake bite and rabid dog bite. Used in mental diseases, sinusitis, rhinitis and internally to relief rheumatic pain. In <i>vedas</i> , this plant name is SOMA, in Ayurveda as a “som-rus” . |
| 18. | <i>Trianthema portulacastrum</i> (Aizoaceae) | Safed santo, desert horse purslane, black pigweed | – Root extract has cathartic, emmenagogue and stomachic properties, that provide relieve against asthma and amenorrhoea. Use in treatment of oedema, jaundice, strangury dropsy, gonorrhoea, liver or kidney infections and wound recovery. Decoction of herbs is used in treatment of rheumatism, alcoholic poisoning and venereal discharge. Decoction of plant is used to prevent from night blindness. |
| 19. | <i>Withania coagulans</i> (Solanaceae) | Paneer-bandh, Punir, Punirbandh, Akri, Binputakah, Paneer-doda, | Property of coagulating milk by its fruits and berries (pulp and husk of the fruits) due to enzyme. Cheese of <i>Withania</i> has a good texture and flavour. “Withanin” chemical is present. Fruits used in Diabetes mellitus. Activity like antimicrobial, carminative, flatulence, dyspepsia, anthelmintic, antifungal, hepatoprotective, hypoglycaemic, hypolipidemic, cardiovascular, free radical scavenging, anti-inflammatory, antitumor, immunosuppressive, depressant properties, etc. ¹ |

Jaisalmer district on the north, Jalore district in the south side and east side are Pali and Jodhpur districts. In west side, it shares the international border with Pakistan. Some part of east side is Aravalli hills, and the maximum region is vastly covered with sand dune that's why they are known as Thar Desert²³. Barmer district is covered by stable and unstable various types of sand dunes magnitude and orientation like longitudinal, transverse etc²⁸. The average annual rainfall is less than 250 mm and cultivation mainly preferred are Kharif season crops like *Pennisetum glaucum* (Bajra/pearl millet), *Vigna radiata* (green gram), *Cyamopsis tetragonoloba* (cluster bean).²⁶ Ethno-medicinal knowledge from local villagers, traditional people provided us humble guide to formation of new drugs than the technique of random screening.

The present study is mainly based on survey, collection of information and conservation of ethno-medicinal plants in the rural areas of Barmer region of Rajasthan. The Barmer has vast desert area but at the same time also has high diversity of medicinal valuable plants species. Barmer district contains about 120 plant species and are known to be important for their ethno-medicinal and pharmaceutical values¹². Ayurvedic practitioners perform the first line of defence against diseases in large areas of the rural part. Overexploitation, over-harvesting is doing extinction and diminishing of diversity. Traditional knowledge is not only upto tribal communities but local villagers and aged people, live in

offside of urban areas also have huge information regarding ethno-medicinal plants. Some endangered ethno-medicinal plants that are present in Barmer region are *Farsetia macarantha* {motio hiranchobbo} *Aristolochia bracteolata*, *Calligonum polygonoides*, *Cardiospermum halicacabum*, *Clerodendrum phlomoidis*, *Evolvulus alsinoides*, *Grewia tenax*, *Maytenus emarginata*, *Mollugo Cerviana*, *Neurada procumbens*, *Ocimum americanum*, *Peganum harmala*, *Pergularia daemia*, *Portulaca oleracea*, *Sarcostemma acidum* and *Trianthema portulacastrum*. They are used in Herbal and Folk Remedies.

Survey

1. Jaisindhar gaon and Malana village

Village Jaisindhar and Malana are located near the border of India – Pakistan. Survey was done in villages: Jaisindhar gaon, Gadra, Khadin, Malana, Lilma, Sona Sandha, Bhure ki Basti, etc. In survey we collected information about uses of ethno-medicinal plants which are used by local people. A structured questionnaire was prepared for this to locals they use endemic plant of their region and especially surrounding themselves. In Barmer District many offside urban communities reside as Rajpoot, Meghwal, Garg, Manganiyaar, Ojha, Jogi, Banajara, Bheel, Lohar, Suthar, etc. and they have huge knowledge of plants uses. During the communication with locals, collected information was noted in note book,

video, audio etc. via any gadget. Manganiyar community sing songs on the plants for their importance and specific characters as like sing ARNI song on Arnia (*Clerodendrum phlomidis*) plant for their white flower character, Neemb ki nimboli for *Azadirachta indica* (Neem plant) etc.

Survey in Barmer Hilly Station- Hill station is there in Barmer city, where numbers of plant species have been seen and mainly Cactaceae family is conserved in their habitat.

Observation

Approximately 201 villagers (131 male and 70 female) were interviewed through structured questionnaire using mobile picture, specimen and walking with villagers in forest. The Hilly Garden Station is located in Barmer city. This is a local conserved area where many plants and animals are conserved in their habitat. It has conservation of guggul plant (*Commiphora wightii*), phog (*Calligonum polygonoids*), Cactaceae family members and many natural habitat plants species. In this region commonly seen is Fabaceae family followed by Euphorbiaceae. Some important plants of Barmer district's are *Azadirachta indica*, *Ocimum sanctum*, *Calligonum polygonoids*, *Salvadora sps.*, *Prosopis cineraria*, *Tridax procumbens* etc. During the survey collected ethno medicinal plants were identified in the herbarium of Botany Department, University of Rajasthan, Jaipur and literature¹⁻²⁸. Efforts have been made for the micro propagation of few plants which are on the verge of

extinction. Some plants with their ethno-medicinal importance (Table-1).

Conclusion

The District Barmer in Rajasthan of Thar Desert exposes a great variety of physiography, geology, plant diversity, and peculiar edaphic and climate conditions. It contains wholesome amount of plant diversity that are used as herbal drugs as well as used for food, fodder, gum, resins, essential oils, dyes, fatty oils, condiments spices etc¹⁰. the present study shows the ethno-medicinal value of local, endangered and vulnerable plants. The enlisted plants are vulnerable and endangered, currently required their conservation, preservation through techniques. There is currently requirement of some diverse strategies to meet the increasing demand for medicinal plants, not only for the local inhabitants but also for international market. Ethno-medicinal survey may help to determine suitable source of ethno-medicinal flora and bring into domestication for human health. Plant tissue culture is also best technique to maximise the endangered, vulnerable and rare plants. Conservation strategies like *in-situ* and *ex-situ* propagation of selected medicinal endangered, vulnerable plants are vital for improving availability and quality of herbal materials. Documentation and certification are main strategies for ethno-medicinally important endangered, vulnerable plants to provide awareness and ultimately improve the community based management of medicinal resource of the region.

References

1. BBS Kapoor, Sunil Kumar. Ethnomedicinal Plants of Barmer District, Rajasthan Used in Herbal and Folk Remedies. *Indian J. Pharm. Biol. Res.* 2013; **1**(3):61-66.
2. Bhandari. Explain about folk medicinal and food plants of the Indian desert, *Flora of the Indian desert*. Published by *Scientific Publishers*. 1978; pp.viii + 472 pp Sen, D. N. (1991). Non-conventional food and some medicinal plant resources of Indian Desert. *Economic plants and microbes: Today and Tomorrow's Printers and Publishers, New Delhi*, 67-76.
3. B Upadhyay, Parveen Anil, K Dhaker, Ashwani Kumar. Ethnomedicinal and ethnopharmaco-statistical studies of Eastern Rajasthan, *J. Ethnopharmacol.* 2010; **129**(1) : Pages 64-86,ISSN 0378-8741,https://doi.org/10.1016/j.jep.2010.02.026.
4. Chandrase M, Nair NC. Flora of Coimbatore. 1988.
5. Chopra RN. Glossary of Indian medicinal plants. 1956.
6. Contribution of Indian Ethnobotany Jain (1998). Ethnomedicinal Plants of Barmer District, Rajasthan Used in Herbal and Folk Remedies. (n.d.). www.ijpbr.in. Ethnobotanical studies in Rajasthan have been carried out by many workers (Katewa and Guri, 1997, Sharma and Khandelwal, 2010, Kapoor and Lakhera, 2013, Joshi and Sharma, 2013).
7. Ghalme RL. Ethnomedicinal plants for skin diseases and wounds from Dapoli tehsil of Ratnagiri district, Maharashtra, India. *Flora & Fauna.* 2020; **26**(1) : 58-64
8. Kant S, Pandey S. Ethnomedicinal plants used for diarrhoea and dysentery by tribal people of Sonbhadra district U.P. India
9. Kapoor BBS. Herbal Plants Used in Folk Remedies by Tribal Communities of Rajasthan: *Proceedings of National*

- Seminar on Conservation of Indigenous Folk Medicinal Plants*, Organized by Kapoor et al. 2013; 1(3) : Available online on www.ijpbr.in 66.
10. Kapoor BBS, Lakhera S. Ethnomedicinal plants of Jodhpur District, Rajasthan used in herbal and folk remedies. *Indian j. pharm. biol. res.* 2013; 1(4) : 71–75. <https://doi.org/10.30750/ijpbr.1.4.13>
 11. Kapoor BBS, Lakhera Swati, Mishra Raksha, Acharya Sanjay. Medicinal Trees of Shekhawati Region of Rajasthan Used in Folk and Herbal Medicines: *Proceedings, National Seminar on Ved, Puran, Mahabharat Aur Ayurved Mai Aushadhya Padap: Upyogita Aur Prasangikta*, Organised by Sanskrit Department, Dungar College , Bikaner. 22-23 October, 2010 : pp 182-185.
 12. Kapoor BBS. Plants Conservation in Puran and Present Context: *Proceedings, National Seminar On Ved, Puran, Mahabharat Aur Ayurved Mai Aushadhya Padap : Upyogita Aur Prasangikta*, Organised by Sanskrit Department, Dungar College, Bikaner. 22-23 October, 2010 : pp 165-168.
 13. Kapoor BBS, Prajapat Rajuram. Medicinal Trees of Shekhawati Region of Rajasthan Used in Folk and Herbal Medicines: *Proceedings, National Seminar on Ved, Puran, Mahabharat Aur Ayurved Mai Aushadhya Padap : Upyogit Aur Prasangikta* , Organised by Sanskrit Department, Dungar College, Bikaner. 22-23 October, 2010 : pp 177-181.
 14. Kapoor BBS, Ranga P. Protection and Conservation of Herbal Diversity of the Rajasthan Desert. *Int. J. Biosci.* 2005; 3(1), 33-37.
 15. Kapoor BBS, Ranga P. Protection and Conservation of Medicinal Plant Wealth of the Rajasthan Desert. *Proceedings of National Seminar on Conservation Utilisation of Natural Resources and their Role in Sustainable Development* organized by SML P.G.College, Jhunjhunu. Oct. 18-19, 2008 : pp 96-99.
 16. Katewa SS, Sharma R. Ethnomedicinal observation from certain watershed areas of Rajasthan. *Ethnobotany* 2001; 10: 46-49.
 17. Mst Nazma Yesmin, Sarder Nasir Uddin, Sanzida Mubassara, Muhammad Ali Akond. Antifungal, antioxidant and antibacterial activities of *Calotropis procera*. *J. Agric. & Environ. Sci.* 5(6), 75–80. <https://doi.org/10.12692/ijb/5.6.75-80>.
 18. Mohil P, Kumari B, Society DW. *Published on/ : 1 st Dec 2012 Floral morphology and ethno-medicinal importance of cistanche tubulosa- A root parasite growing in Churu region, A part of the Thar desert.* 2012; 4297: 23–28.
 19. Nair NC, Henry AN. *Flora of Tamil Nadu, India.* 1983.
 20. Nautiyal S, Kumar R, Husan A. Status of medicinal plants in India, *Ann. For. Sci.* 2002; 10: 181-190.
 21. Pagaria P, Kendra KV. *Value chain study of medicinal plant Shankpushpi (Convolvulus pluricaulis) in Barmer district of Rajasthan. March.* 2021.
 22. Pandey DN. Direct sowing and planting of *Salvadora persica* (Linn .) and *Salvadora oleoides* (Decne .) for Ecological Restoration and Livelihoods Improvement in Thar Desert. *Dlc.Dlib.Indiana.Edu.* 1996; 27(1973) : <http://dlc.dlib.indiana.edu/dlc/handle/10535/3762>.
 23. Rao KS, Sringeswara AN, Kumar D, Pulla S, Sukumar R. A digital herbarium for the flora of Karnataka. *Curr. Sci.* 2012 : 1268-1271.
 24. Rao RR, Hajra PK. Methods of research in ethnobotany. *A manual of ethnobotany.* 1987; 33-41. SML PG College, Jhunjhunu. February 3- 4, 2012, 7-8. 12. ,
 25. Sharma Himanshu, Kumar Ashwani. Ethnobotanical studies on medicinal plants of Rajasthan (India): A Review. *J. Med. Plant Res.* 2011; 5(7):1107-1112.
 26. Sharma LK, Kumar A. Ethnomedicinal and photochemical studies on some selected medicinal plants of Rajasthan. *Indian J. Environ. Sci.* 2006; 1(10): 51-53.
 27. Shetty BV, Singh V. *Flora of Rajasthan, Vol. I. Botanical Survey of India, Calcutta.* 1987 : p 451
 28. Singhadiya M, Maina V, Pandey R. *Withania coagulans* (Stocks) Dunal - A Rare Ethnomedicinal Plant in the Western Rajasthan Desert, India. *JNTFP.* 2015; 22(1) : 57–59. <https://doi.org/10.54207/bsmps2000-2015-k7zm4f>.