

# Bioprospecting in a Tropical Dry Deciduous Forest of Western Rajasthan, India

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**ABSTRACT** : Bioprospecting has been widely used to assess the economic potential of different plant species and their value-addition. Prospecting for biological material like plants with medicinal or other economically valuable properties like fibre or oil is becoming a dynamic activity. Our folklore with embedded cultural heritage has tremendous possibilities and potential for bioprospecting. This forest region of Western Rajasthan is enriched with diverse vegetational wealth, if subjected to bioprospecting may prove to be a boon for the society.

**Keywords** : Bioprospecting, Biodiversity conservation, Sustainable development, Traditional wisdom.

## INTRODUCTION

Forest is a living resource. A large number of people of the hill and plain area depend on forest resources. Forest constitutes the richest sources amongst the other resources of the world. They are the vital component to sustaining the life support system on earth. Forests have been playing a pivotal role in the socio-economic development of a country or region. They are the important sources of raw material to various industrial uses, food security, biodiversity conservation and sustainable development have been widely recognized. Forests are the sources of various components, e.g., food, fodder, fiber, medicinal, tannin and oils, gum and many other things for human benefits. Generally it is observed that the forest areas in the vicinity of the villages have been degrading much faster rate than the forests growing far from the village locality. It is due to easily accessible to the villagers for their basic needs. Therefore, there is an urgent need to conserve the forest resource both macro and molecular level for human and sustainable development.

There is worldwide realization of social awareness on

biodiversity conservation issues. Numerous national and international conferences and meetings have been held on the subject. The Earth Summit, organized through the participation of more than 140 countries in Rio De Janeiro over 15 years ago in June 1992, produced Agenda 21, a blueprint from international cooperation on environment and sustainable development. The conference ultimately resulted in the holding of the Convention on Biological Diversity (CBD), for global commitment towards the conservation of biological diversity and the sustainable and equitable sharing of its benefits arising from the use of genetic resources. Recently, the term bioprospecting has emerged as a new tool for capitalization of traditional wisdom and available natural resources.

The World Resource Institute (WRI) defined bioprospecting as 'Exploration of commercially valuable genetic and biochemical resources'. It is felt that the term bioprospecting should include the cultivation of traditional concepts with contemporary tools, techniques and prospective. It should cover the unconditional welfare of biodiversity itself, with the communities where knowledge is taken through bioprospecting.

Thus it is important to treat bioprospecting in the context of a strong benefit-sharing system among industries/firms, the ecosystem and the projected communities in such manner as that the sharing of knowledge for bioprospecting will multiply the faunal and floral diversity of that region and enrich the cultural and moral ethics with sustained life-support systems.

The present article attempts to highlight the bioprospecting in tropical dry deciduous forest of Rajasthan because traditional knowledge on resource use could not be utilized for the larger benefit of the society for long and so far the knowledge has remained confined to the region. The results reported here are the outcome of an extensive study of the literature on Rajasthan flora, its uses and beliefs. Information has also been gathered from local people by an ethno botanical survey. Bioprospecting during the study was confined to non-timber forest products of the region.

### STUDY AREA

The study site was located between 23°49' to 25°28' N

latitudes and 73°0' to 75°49' E longitudes at an average altitude of 579.4 m in the Udaipur district of Rajasthan, India (Figure 1). The climate of the study area is tropical and monsoonal. The year is divisible into three seasons, viz. rainy (July-October), winter (November-February), and summer (March-June). The annual average rainfall is 493 mm with majority of rain falling between June to October.

### BIOPROSPECTING

The forest area has more than 60 species of flowering plants with the potential for bioprospecting. This region is represented by various tribes and communities with distinct cultures as well as traditional features. Each of these groups has its own wisdom about the ethnic use of flowering and non flowering plants. The indigenous flora utilized by the communities has substantial influences on their culture, customs, craftsmanship, ethos, religious rites, socio-cultural beliefs, food habits, settlement patterns and various other resource-based practices.

There are various plants and plant parts used in

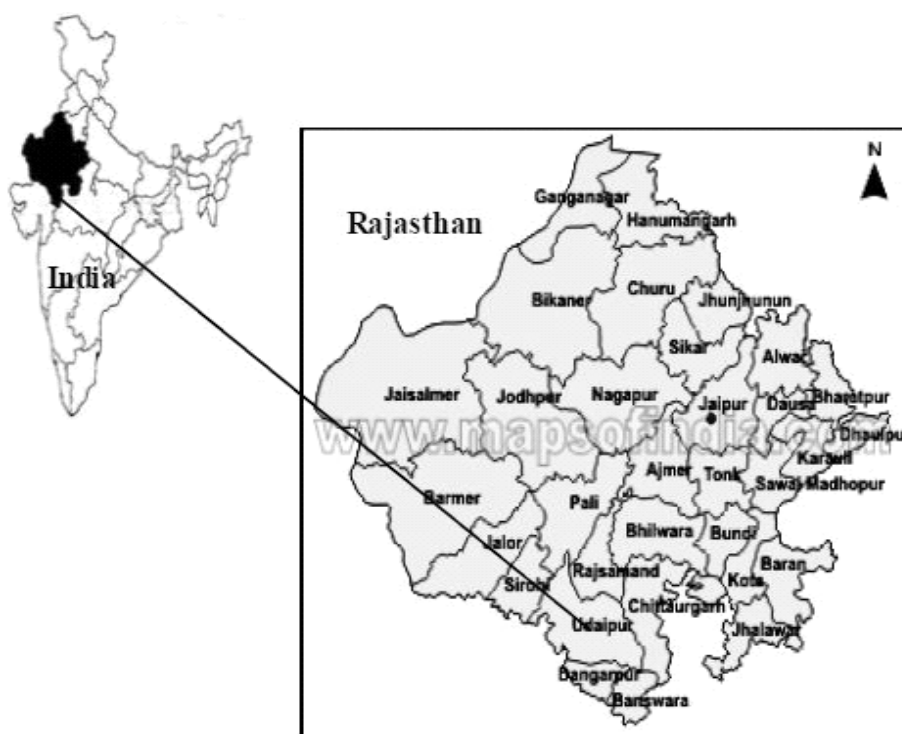


Fig. 1. Location of Study area in Udaipur, Rajasthan, India

religious observances, traditional healthcare practices, in preparation of beverages, fruits and vegetables, as spices and condiments, extraction of oils, gums, resins and natural dyes, production of fuel, and fodder and fiber. Some of them are listed in Tables 1-4.

Bioprospecting in the forest may not only provide raw materials for pharmaceuticals, but for various other plant-based industries in the field of arts, crafts and homemade edible food items such as jam, jelly, juice, etc (Yogesh, 2008; Siva, 2007)

**Table 1.** Some medicinal plant species used against various human ailments in traditional system from the forest area having bioprospecting potential.

Botanical name	Vernacular name	Parts used/ mode of application	Uses
<i>Abrus precatorius</i>	-	Root paste and Leaf juice	Cough, cold wounds and urinary complaints
<i>Abutilon indicum</i>	-	Leaf extract with buttermilk given orally	Dysentery
<i>Acalypha indica</i>	-	Leaf paste with common salt and mixed with curd is applied externally	Sores and scabies
<i>Achyranthes aspera</i>	Modokanto	Root decoction and dry plant ash mixed with honey	Typhoid, cough, asthma and urine complaints
<i>Adhatoda zeylanica</i>	Vasaka		
<i>Ailanthus exelsa</i>	Paba	Leaf decoction	Arthritis
<i>Annona squamosa</i>	Sitaphal	Dried leaf ash and leaf juice	Kill lice, worms and cure itches and boils
<i>Anogeissus latifolia</i>	Adruk	Plant exudation	Scorpion and snake bite
<i>Argemone mexicana</i>	Darueli	Root extract in water is taken orally	Round worm and purify blood
<i>Asparagus racemosus</i>	Satawari	Root decoction, root with milk and dried root powder	Dysentery and as a tonic
<i>Boerhavia diffusa</i>	Punarnava	Root decoction	Jaundice
<i>Boswellia serrata</i>		Essential oil	Cancer
<i>Bridelia retusa</i>	Lampana		
<i>Butea monosperma</i>	khakhro	Bark exudation	Diarrhea, general debility
<i>Calotropis procera</i>	Aakda	Leaf and root extract	Scorpion bite, fever, chest and abdomen pain
<i>Cardiospermum halicacabum</i>	-	Dried plant powder is mixed with coconut oil is applied externally and plant decoction	Sores and wounds, rheumatism
<i>Cassia auriculata</i>	Aval	Fresh flowers take orally	Diabetes and urinary disorders
<i>Cassia occidentalis</i>	-	Paste of fresh leaflets warmed in ground nut oil is applied externally	Cuts and wounds
<i>Cassia tora</i>	Pavad	Leaf extract is applied externally	Ringworms and itch
<i>Centella asiatica</i>	Brahmi	Leaves	Dysentery
<i>Chenopodium album</i>	Chil	Cooked leaves	Seminal weakness and general debility
<i>Cissampelos pariera</i>	Thubuki	Root decoction	Snake bite, Rabid dog bite and pneumonia
<i>Cocculus hirsutus</i>	-	Leaves and roots	Saliva secretion and rheumatism
<i>Commelina benghalensis</i>	-	Stem and leaves are applied externally	Bleeding
<i>Commiphora wightii</i>	Guggul	Fumes of resinous gum are inhaled	Fever, bronchitis
<i>Corchorus depressus</i>	Chamkan	Plants dried in shade and powdered are taken regularly with fresh goat milk	Increasing sexual power

**Table 1.** (Continued)

Botanical name	Vernacular name	Parts used/ mode of application	Uses
<i>Crotalaria burhia</i>	Kharsana	Root extract with sugar	Kidney pain
<i>Croton bonplandianum</i>	-	Leaf infusion	Fever, infection of glands
<i>Curculigo orchiodes</i>		Tuberous roots	Enlarged spleen
<i>Cyperus rotundus</i>	Kali musli	Dried tubers	Stomach complaints
<i>Dendrocalamus strictus</i>	Vans	Inner portion of culms	Tuerculosis
<i>Desmodium gangeticum</i>	-		
<i>Dioscorea bulbifera L.</i>	Ratalu	Tubers	Bronchial cough
<i>Euphorbia hirta</i>	-	Entire plant with curd	Piles
<i>Flacourtia indica</i>	kakar	Root paste is taken orally with water	Chronic abdomen pain
<i>Helicteres isora</i>	Atedi	Dry fruit powder is taken with water	Stomach pain, diarrhea and dysentery
<i>Heliotropium indicum</i>	-	Extract of stem and onion is taken orally	Rabies, ulcer and sores
<i>Hemidesmus indicus</i>	-	Root decoction/Root powder added with hair oil	Hair growth and inflammation
<i>Indigofera tinctoria</i>	-	Root, leaf paste	Antidote for poisoning, boils
<i>Ipomoea pes-caprae</i>	-	Leaf paste	Skin disease, boils, swellings and wounds
<i>Jatropha curcas</i>	Ratanjyot	Bark, seed oil and juice	Mouth sores, scabies, rheumatism
<i>Lannea coromandelica</i>	Godal	Leaves, bark and fruit	Ulcers, eye sores, toothache and elephantiasis
<i>Lepidium sativum</i>	Aalio	Seeds	Wounds, hiccup
<i>Leptadenia pyrotechnica</i>	Khimp	Plant sap	Eczema and diabetes
<i>Leucas aspera</i>		Leaf juice is administered in nostrils	Sinusitis
<i>Madhuca indica</i>	Mahua	Decoction of bark	Dysentery and diarrhea
<i>Oxalis corniculata</i>	-	Plants powdered with cumin seeds	Dysentery
<i>Pedaliium murex</i>	-	Paste prepared from leaves, ginger and common salt	Tympany
<i>Phoenix sylvestris</i>	Khajuri	Stem juice	Tonic and laxative
<i>Portulaca oleracea</i>	-	Entire plant	Antibacterial
<i>Sesbania sesban</i>	-	Seed paste	Abortion
<i>Sida cordifolia</i>	-	Leaf juice and root powder	Snake bite, wounds
<i>Sphaeranthus indicus</i>	-	Leaf powder	Skin diseases, nervine tonic
<i>Tephrosia purpurea</i>	Biyani	Root decoction mixed with black pepper	Fever
<i>Tribulus terrestris</i>	Gokhru	Decoction of leaf and root	Kidney stone
<i>Tridax procumbens</i>	Lardiolapsi	Leaf extract is applied locally	Boils, blisters
<i>Vernonia cinerea</i>	-	Leaf decoction	Fever
<i>Xanthium strumarium</i>	Bada gokhru	Leaves	Fever and cough

**Table 2.** Some wild plants used as edibles having bioprospecting potential.

Botanical name	Vernacular name	Parts used	Uses
<i>Adhatoda zeylanica</i>	-	Young shoot/leaves	Edible
<i>Aegle marmelos</i>	Beel	Fruits	Edible when ripe
<i>Albizia procera</i>	Garad	Leaves	Vegetable

**Table 2.** (Continued)

Botanical name	Vernacular name	Parts used	Uses
<i>Amaranthus caudatus</i>	Kangani	Young shoot/leaves	Edible
<i>Amaranthus spinosus</i>	-	Leaves	Vegetable
<i>Amaranthus viridis</i>	-	Leaves	Vegetable
<i>Bauhinia purpurea</i>	-	Flowers	Edible
<i>Bombax ceiba</i>	Simbal	Flowers	Edible
<i>Cannabis sativa</i>	-	Seeds/grains	Eaten raw and roasted
<i>Cassia occidentalis</i>	-	Seeds	Non-alcoholic beverage
<i>Centella asiatica</i>	Brahmi	Leaves, stem	Vegetable
<i>Cleome viscosa</i>	-	Seeds/grains	Used as spices
<i>Cyperus rotundus</i>	-	Underground part	Edible
<i>Datura stramonium</i>	-	Leaves	Non-alcoholic beverage
<i>Dioscorea bulbifera</i>	Ratalu	Tuberous roots	Edible
<i>Diospyros melanoxylon</i>	Timru	Fruits	Edible
<i>Ficus auriculata</i>	-	Unripe fruit	Edible
<i>Hemidesmus indicus</i>	-	Leaves	Alcoholic beverage
<i>Mimusops elengi</i>	-	Fruits	Taken raw
<i>Oxalis corniculata</i>	-	Leaves, stem	Vegetable
<i>Syzygium cuminii</i>	Jamun	Fruits	Taken raw
<i>Woodfordia fruticosa</i>	-	Flowers	Edible
<i>Zizyphus mauritiana</i>	-	Fruits	Taken raw

**Table 3.** Some forest plants used for making dye.

Botanical name	Vernacular name	Parts used	Uses
<i>Acacia catechu</i>	Khair	Heartwood	Brown, black
<i>Acacia nilotica</i>	Babool	Seed pod	Blue
<i>Adhatoda vasica</i>	Vasaka	Heartwood	Yellow
<i>Aegle marmelos</i>	Beel	Fruit rind	Yellow
<i>Azadirachta indica</i>	Nim	Bark	Brown
<i>Bauhinia variegata</i>	Khati hetri	Bark	Yellow
<i>Butea monosperma</i>	Khakhro	Flower	Yellow
<i>Cassia auriculata</i>	Aval	Flower, seed	Yellow
<i>Cassia occidentalis</i>	-	Seed	Brown
<i>Citrus medica</i>	-	Bark	Black
<i>Clitoria ternatea</i>	-	Flower	Blue
<i>Dioscorea bulbifera</i>	Ratalu	Tuber	Pale colour
<i>Indigofera tinctoria</i>	-	Leaf	Blue
<i>Jatropha curcas</i>	Ratajyot	Bark, leaf	Blue
<i>Lawsonia inermis</i>	Mehndi	Leaves	Orange
<i>Mimusops elengi</i>	-	Bark	Brown
<i>Oldenlandia umbellata</i>	-	Whole plant	Red
<i>Oxalis corniculata</i>	-	Leaf	Blue
<i>Tectona grandis</i>	Sagvan	Leaf	Yellow
<i>Terminalia chebula</i>	-	Fruit	Black
<i>Wrightia tinctoria</i>	Khirmi	Leaves	Blue

**Table 4.** Some forest plants used for yielding fiber.

Botanical name	Vernacular name	Parts used	Uses
<i>Acacia nilotica</i>	Babool	Bark/stem	Fiber for rope, basket, mat, etc.
<i>Bauhinia racemosa</i>	Hentari	Stem	-do-
<i>Bombax ceiba</i>	Simbal	Bark	-do-
<i>Butea monosperma</i>	Khakhro	Bark/stem	-do-
<i>Calotropis gigantea</i>	Safed aakda	Stem	-do-
<i>Calotropis procera</i>	Aakda	Stem	-do-
<i>Cissampelos pareira</i>	-	Stem	-do-
<i>Cordia dichotoma</i>	Gonda	Stem	-do-
<i>Cryptostegia grandiflora</i>	-	Stem	-do-
<i>Ficus benghalensis</i>	Bargad	Bark/stem	-do-
<i>Holoptelea integrifolia</i>	Kanjo	Bark/stem	-do-
<i>Ichnocarpus frutescence</i>	-	Bark	-do-
<i>Leptadenia pyrotechnica</i>	-	Bark/stem	-do-
<i>Phoenix sylvestris</i>	Khajuri	Stem	-do-

## CONCLUSION

Traditional knowledge is an integral part of our country. India's magnificent past and its immense vegetational wealth places the country among the mega-biodiversity centres of the world. Unlike other developed Asian countries such as Japan, Korea and China, we have not been able to capitalize much on our natural resources and inherited wisdom. For developing countries like India, there is an urgent need to identify at least the existing bioresources and traditional wisdom to prevent biopiracy and building up capabilities to utilize natural resources and capitalize on the grassroots knowledge for potential rural economy.

It would be an emerging sector for future research and development programmes, enabling us to make use of biodiversity for noble causes and conservation. The forest area is enriched with diverse vegetational wealth and indi-

genous wisdom of resource use, if subjected to bioprospecting may prove to be a boon for the society.

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