

Unrecorded Ethnomedicinal Uses of Biodiversity from Tadgarh-Raoli Wildlife Sanctuary, Rajasthan, India

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Abstract: Extensive ethnomedicinal survey was carried out during the year 2003 - 2005 to document the precious indigenous health care practices prevalent among the different ethnic groups (Bhil, Meena, Garasia, etc) of Tadgarh-Raoli wildlife sanctuary . This sanctuary is located in Rajsamand, Pali, and Ajmer districts of South-east Rajasthan, India . The tribals belonging to primitive or aboriginal culture possess a good deal of information about medicinal utility of biodiversity . During the survey, it was noted that plant or plant parts as well as animals and substances derived from animal origin were commonly used by the tribals to cure various diseases and disorders . Indigenous healthcare practices, provide low cost alternatives in situation where modern health care services are not available or too expensive .

Analysis of data based on 85 remedies indicates that 70 remedies are based on 45 different species of plants belonging to 28 families and 17 remedies are based on several substances of animal origin to cure various ailments through indigenous health care practices . A list of plant and animal species along with their scientific name, parts used and the mode of administration for effective control in different ailments are given .

Key words: Tadgarh-Raoli wildlife sanctuary; Biodiversity utilization; Tribals; Rajasthan; Ethnomedicine

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The World Health Organization (WHO) estimates that as many as 80% of the world's population rely primarily on plant and animal-based medicines . Among the 252 essential chemicals that have been selected by the World Health Organization, 11.1% come from plants, and 8.7% from animals (Marques, 1997) . Tribal and rural populations have a broad natural pharmacopoeia consisting of wild plant and animal species . Ingredients sourced from wild plants and animals are not only used in traditional medicines, but are also increasingly valued as raw materials in the preparation of modern medicines . In India nearly 15 - 20 percent of the Ayurvedic medicine is based on animal-derived substances (cheese, milk, meat, eggs, chicken, sea shell and animal parts) (Unnikrishnan, 1998) .

Even today in most of the rural areas, people depends on local traditional healing system for their primary health care . The tribals of remote areas of Tadgarh-Raoli wildlife sanctuary, Rajasthan are totally dependent on indigenous 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

since the government dispensaries are far away from their bodies .

The Tadgarh-Raoli wildlife sanctuary lies in South-east region of Rajasthan, India . Geographically the area of sanctuary is a land of contrast, with rivers, valleys, dense forests and sandy plains overlooked by the ancient hills of Aravallis . Spreading over an area of 497 km², the sanctuary represents the " Northern Tropical Dry Deciduous Forest " type . Difference in altitude offers a great variety of flora and fauna, which can be seen here due to diverse ecosystem, namely lakes, forests and grasslands . In its eastern part are found mountain ranges reaching to an altitude of more than 1 067 m, while the western part of this sanctuary is adjoining to " Marwar " plains . The distinguishing characters of climate of the sanctuary is its dryness, uncertainty of rainfall and great variation in temperature during different seasons of the year, even the climate is healthy . There is a dry period from October to June . The rainfall varies in different place and it is irregularly distributed . In the western plains sometimes records the temperature of 48 °C, however eastern slope provides re-

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lief, as the temperature does not rise more than 38 °C. During winters the minimum temperature goes as low as 5 °C. The main floral diversity of this region is *Acacia catechu* (L. f.) Willd. (Khair), *Zizyphus mauritiana* Lamk. (Ber), *Butea monosperma* (Lam.) Taub. (Dhok), *Anogeissus latifolia* Wall. ex Guill & Perr. (Dhawda), *Acacia senegal* (L.) Willd. (Kumtha), *Boswellia serrata* Roxb. ex Cocl. (Salar) and *Capparis decidua* (Forsk.) Edgew. (Kair) and the faunal diversity is *Gazella bennettii* (Chinkara), *Boselaphus tragocamelus* (Nilgai), *Lepus nigricollis* (Indian Hare), *Felis chaus* (Jungle cat), *Sus scrofa* (Indian wild bear). Besides these mammals several water and terrestrial birds and reptiles are also found.

The major tribes inhabiting in or around the sanctuary are Bhil, Meena, Garasiya etc. Bhil are the aboriginal inhabitant of Rajasthan residing on the Aravalli. The total tribal population of these three districts in which sanctuary situated is 35, 94, 659. Out of this 1% tribal population is residing in the sanctuary area (Census 2001). Originally Bhils are hunters. The main occupation of these tribes is agriculture but at present tribal people earn their livelihood by serving as labours in road, mines and forest operation. The surrounding plants and animals form an integral part of culture of these people and information about indigenous health care practices is passed on from generation to generation orally through oral folklore, although it is often kept secret.

The age-old culture and traditions related to plants and animals certainly amply to the richness of our heritage. This knowledge of rural people with the traditional healing practices using wild plants and animals is now fast disappearing due to modernization and the tendency among younger generation to discard their traditional lifestyle. Medicinal folklore over the years has proved to be an invaluable guide in present day to the screening of important modern drugs (e.g., digitoxin, reserpine, tubocurarine, ephedrine, to name a few) that have been discovered by following leads from folk uses (Anyinam, 1995). In view of this, it is evident the need to document the traditional knowledge of human communities, mainly because the majority of such communities are rapidly losing their socioeconomic and cultural characteristics.

Studies on Indigenous health care practices among the tribal dominated parts of Rajasthan have been car-

ried out by many workers (Singh and Pandey, 1998; Joshi, 1995; Sebastian and Bhandari, 1984; Katewa and Arora, 1997; Sharma and Asawa, 1999; Katewa et al. 2001 a, b, 2003, 2004, 2005; Jain et al. 2003, 2005; Jain and Katewa, 2005; Katewa and Galav, 2005). So far no systematic investigation was ever done on the indigenous health care practices used by the tribal people of Tadgarh-Raoli wildlife sanctuary of Rajasthan. The paper discusses the plants and animal products being administered as medicine by the tribals of Rajasthan. The uses or information recorded here, have not been mentioned hitherto.

Methodology

Ethnomedicinal surveys were conducted repeatedly by the authors in different seasons and areas of the Tadgarh-Raoli Wildlife Sanctuary during the year 2003 - 2005. Ethnomedicinal information on wild plants and animals was collected through interviewing local informants. The local informants were medicine-men, men and women working in the field, priest, village headman and birth attendant above the age of 50 years. To determine the authenticity of information collected during field work, repeated verification of data from different informants and in different times was done. Thus, only the specific and reliable information cross-checked with 13 informants has been incorporated in present study. A structured questionnaire was used to collect data on local plant names, uses, parts used, and mode of preparation and administration.

During the survey some interesting folk uses of plants and animals have come to light which are not mentioned in literature related to alternative medicine. The collected medicinal plants were identified up to species level with the help of flora (Hooker, 1872 - 1897; Singh and Shetty, 1987 - 1993; Bhandari, 1990). Final confirmation of the identified plants was done from FRI Herbarium, Dehradun. All the collected specimens were deposited in the Herbarium of Laboratory of Ethnobotany and Agrostology, Department of Botany, College of Science, M. L. Sukhadia University, Udaipur for authentication of information and further references. The information about the medicinal properties of plants and animals are given by mentioning their Botanical name/Zoological name, local name, habitat, parts used and the mode of administration.

Result and Discussion

The traditional knowledge system in India is fast eroding. There is an urgent need to invent and record all ethnobiological information among the diverse ethnic communities before the traditional culture is completely lost. Often, tribals are exploited by the modern societies and they are forbidden to use the forest resources

with which their lives are strongly interwoven .

Analysis of data based on 85 remedies indicates that 70 remedies are based on 45 different plant species belonging to 28 families (Table 1) and 17 remedies are based on substances of animal origin (Table 2) to cure various ailments through indigenous health care practices . A review of literature indicates that the ethnomedicinal uses of *Inula racemosa*, *Herminium angustifolium*

and *Premna mucronata* are hitherto not reported . Most of the remedies reported in the current article are not reported in available literature (Singh and Pandey, 1998; Joshi, 1995; Sebastian and Bhandari, 1984; Katewa and Arora, 1997; Sharma and Asawa, 1999; Katewa *et al.* 2001 a,b , 2003, 2004, 2005; Jain *et al.* 2003, 2005; Jain and Katewa, 2005; Katewa and Galav, 2005) notable among them are latex of *Euphorbia caducifolia*

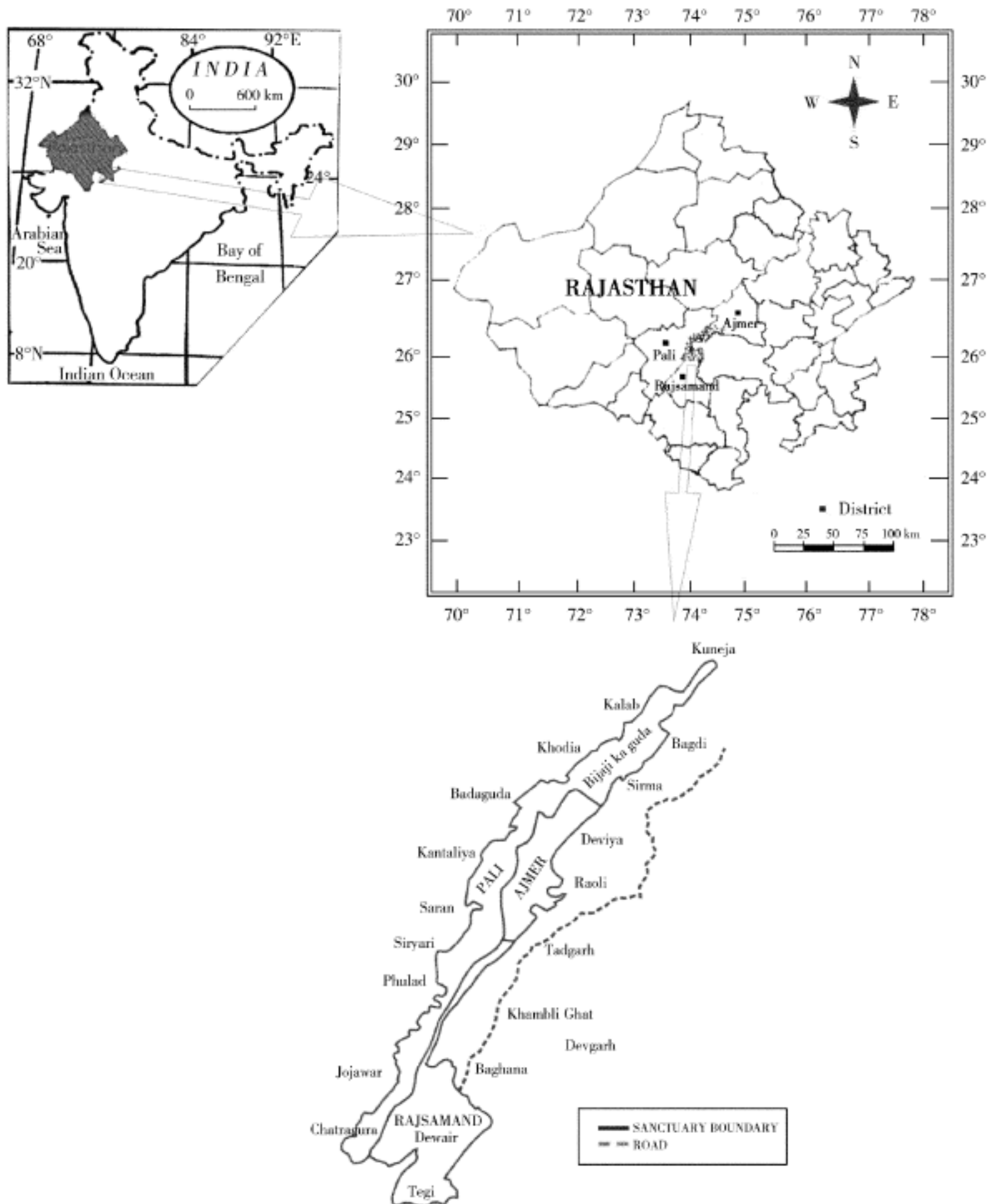


Fig . 1 Location map of Tadgarh-Raoli wildlife sanctuary

Table 1 List of Ethnomedicinal plants used by the tribals to cure various ailments

Name of the plant species	Local name	Herbarium number	Plant parts or plant product used	Mode of administration
<i>Acacia nilotica</i> (Linn.) Willd. ex Del. (Mimosaceae)	Kikar, Babul, Desi-babul	* EA 58	Leaves	Poultice of leaves is tied on the eyes in ophthalmia.
<i>Achyranthes aspera</i> Linn. (Amaranthaceae)	Andhijhara, Undhokanto, Kharia	EA150	Leaves	Paste is prepared from the leaves and insects feeding on it, and given orally to the child suffering from asthma.
<i>Alangium salvifolium</i> (L.f.) Wang. (Alangiaceae)	Aankol, Ankola	EA 114	Leaves	Extract of two or three leaves is taken orally by the tribals in fever.
<i>Barleria prionitis</i> Linn. (Acanthaceae)	Bajradanti, Kanta sulio	EA 279	Root, Leaves	Extract of the leaves is poured in the ear in earache.
<i>Boerhavia diffusa</i> Linn. (Nyctaginaceae)	Punarnava	EA 107	Leaves	Leaves are chewed by the tribals in case of scorpion bite as an antidote.
<i>Boswellia serrata</i> Roxb. ex Coels. (Burseraceae)	Halar, Salar	EA 52	Stem bark	Extract of 200 gm stem bark is taken orally by the tribals to cure stomachache.
<i>Butea monosperma</i> (Lam.) Taub. (Fabaceae)	Dhok, Dhauk	EA 190	Gum, Twig, Pods	(i) 50 gm gum is fried in clarified butter, mixed with jaggery and taken orally by the tribal ladies in backache. (ii) Twigs are used as toothbrush in toothache. (iii) Paste prepared from the pods is applied locally in scorpion bite
<i>Calotropis procera</i> Br. (Asclepiadaceae)	Akdo, Aak, Aakro	EA 214	Stem latex, Root	(i) Latex of <i>Calotropis procera</i> is mixed with sodium chloride (NaCl) and warmed on hot iron plate by slow heating. During heating continuous stirring should be done. One microgram of this powder is given orally thrice a day for five days to the patient of tuberculosis. (ii) Extract of root is taken orally by the tribal ladies in dysmenorrhea. (iii) The latex is applied locally to cure leucoderma. During the course of this treatment, decoction prepared from the whole plant of <i>Swertia chirayita</i> is also taken. (iv) 4 gm latex of <i>Calotropis procera</i> is taken orally by the tribals as an antidote in rabies.
<i>Cassia tora</i> Linn. (Caesalpinaceae)	Punwad, Phunwaria	EA 181	Leaves	One fourth cup of leaves extract is taken thrice a day for three days to cure jaundice.
<i>Commiphora wightii</i> (Arm.) Bhandari (Burseraceae)	Gugal	EA 201	Gum	Gum solvent is applied on abscesses for early cure.
<i>Corallocarpus epigaeus</i> (Rottl. & Willd.) Hook. f. (Cucurbitaceae)	Marsikand, Kadwi-nai, Mirch bel, Kadvi bel	EA 227	Root	(i) One teaspoon root powder is mixed with three teaspoon refined butter and taken orally by the tribals only once as an antidote in snake-bite. (ii) Half teaspoon of tuber extract is given to children suffering from asthma.
<i>Curculigo orchoides</i> Gaertn. (Hypoxidaceae)	Kali musli, Khajuri	EA 126	Root	(i) 50 gm root powder is taken with one cup refined butter as a first aid in snake bite. (ii) One teaspoon powder is taken orally by the tribal women for 7-10 days to cure leucorrhoea and menorrhagia.
<i>Dyerophytum indicum</i> (Gibbs. ex Wight) O. Ktze (Plumbaginaceae)	Chitrak, Chitawal	EA 411	Root	Root paste is applied locally to cure scabies, eczema, warts and other skin diseases. Root paste is also applied on forehead to cure migraine.
<i>Elytraria acaulis</i> (L.f.) Lind. (Acanthaceae)	Kala gathia, Galobi	EA 314	Leaf	Extract of 100gm leaves is taken orally by the tribal ladies during first 2-3 days of menses in dysmenorrhoea. During the course of this treatment, vegetable oil and acidic food is prohibited in diet.
<i>Euphorbia caducifolia</i> Haines (Euphorbiaceae)	Thor	EA186	Latex	4 gm latex of <i>Euphorbia caducifolia</i> is taken orally by the tribals as an antidote in rabies.
<i>Euphorbia hirta</i> Linn. (Euphorbiaceae)	Dudhi, Choti dudhi, Kadeya	EA 140	Whole plant	(i) Extract of whole plant is given orally once or twice in a day as febrifuge to children. (ii) Paste of 2-3 plants is taken orally with water to cure dysentery.
<i>Evolvulus alsinoides</i> Linn. (Convolvulaceae)	Phool	EA 180	Leaves	(i) 5-6 leaves are crushed and taken orally by the tribals in enlargement of spleen. During the course of this treatment it is advised to eat less quantity of vegetable oil, acidic foodstuff, chilly and salt. (ii) 50 gm powder of whole plant of <i>Evolvulus alsinoides</i> and 50 gm of <i>Convolvulus prostratus</i> is mixed in 100 gm sugar. 10 gm of this powder is taken orally by the tribal ladies twice in a day for 10 day to cure leucorrhoea.
<i>Foeniculum vulgare</i> Mill. (Apiaceae)	Sanuf	EA 550	Seed	A mixture of 100 gm seed powder of <i>Foeniculum vulgare</i> , 200 gm seed powder of <i>Papaver somniferum</i> , 100 gm fruit powder of <i>Coriander sativum</i> and 200 gm of sugar is prepared and 50 gm of this mixture is taken by the tribal ladies early in the morning to cure leucorrhoea.
<i>Jatropha curcas</i> Linn. (Euphorbiaceae)	Ratanjot	EA 151	Latex	One drop of latex is poured in eyes to cure conjunctivitis.
<i>Gloriosa superba</i> Linn. (Liliaceae)	Kalihari	EA 222	Tuber	One fourth teaspoon of tuber powder is taken orally by the tribal ladies only once to regularize menstrual disorder.

Continue table 1

Name of the plant species	Local name	Herbarium number	Plant parts or plant product used	Mode of administration
<i>Guizotia oleifera</i> DC . (Asteraceae)	Keli teeli	EA 547	Seed	Seed powder is taken orally by the tribals to get rid of intestinal worms .
<i>Herminium angustifolium</i> DC . (Orchidaceae)	Nazar ki dawai	EA 548	Root	Root extract is taken twice a day for three months to cure tuberculosis .
<i>Holarrhena pubescens</i> (Buch- Ham .) Wall . ex G . Don (Apocynaceae)	Kadu	EA 137	Stem bark	Mixture of equal quantity of stem bark and dried tuber powder of <i>Curcuma aromatica</i> is prepared . Two tea spoon of this mixture is taken orally once in a day for 3 days to cure rheumatism . During this treatment vegetable oil, acidic foodstuffs, chilly and salt is strictly prohibited .
<i>Inula racemosa</i> HK . f . (Asteraceae)	Vaada	EA 549	Root	(i) Root is used in incense . (ii) Poultice of crushed leaves and roots is tied over the joints in rheumatism . (iii) Root powder is taken orally by the tribal ladies to prevent conception .
<i>Momordica charantia</i> Linn . (Cucurbitaceae)	Karela	EA 244	Leaf	Leaf juice of <i>Azadirachta indica</i> and <i>Momordica charantia</i> is mixed and used as an antiseptic to wash purulent wounds for early cure .
<i>Momordica dioica</i> Roxb . ex Willd . (Cucurbitaceae)	Jangli karela, Kikora	EA 175	Seeds	Paste of seeds is applied on the abdomen in dysuria and also taken orally in constipation .
<i>Mucuna pruriens</i> (Linn .) DC . (Fabaceae)	Kamach, Konch	EA 356	Seeds	The pods are dried after boiling in milk for about 2-3 hours and seeds are separated from pods . Powder of these seeds is taken orally by the tribal ladies to cure leucorrhoea .
<i>Musa paradisiaca</i> Linn . (Musaceae)	Kala	EA 363	Stem sap	(i) One glass of sap collected by making incision at the bottom of the stem is given orally to tribal ladies to develop complete sterility . (ii) Extract of either flower or rhizome is taken orally by the tribal ladies to cure leucorrhoea .
<i>Ocimum tenuiflorum</i> Linn . (Lamiaceae)	Bapchi	EA 364	Whole plant	(i) Tribals keep the part of plant in their pocket to keep away snakes during sleep . (ii) Leaves of <i>Ocimum tenuiflorum</i> , and seeds of <i>Piper nigrum</i> are crushed in curd and taken orally by the tribals to prevent growth of cancerous tumour in any part of the body .
<i>Opuntia elatior</i> Mill . (Cactaceae)	Kantella thor	EA 481	Fruits	(i) Juice of 7-8 fruits is mixed with 50 gm jaggery and taken orally by the tribal ladies for 2-3 days to develop complete sterility . (ii) The warmed pulp of phylloclade is applied externally on abscesses and boils for speedy recovery . (iii) Pulp of phylloclade mixed with turmeric powder (<i>Curcuma aromatica</i>) is applied locally in abdominal pain or in body pain .
<i>Phyllanthus fraternus</i> Webst . (Euphorbiaceae)	Bhui-amlam	EA 145	Whole plant	(i) Powder of whole plant of <i>Phyllanthus fraternus</i> and seed powder of <i>Trachyspermum ammi</i> is mixed with common salt and one teaspoon of this mixture is taken orally after each meal for easy digestion . (ii) Extract of whole plant is given orally once or twice in a day to children as febrifuge .
<i>Phyllanthus virgatus</i> Forst . F . (Euphorbiaceae)	Bhui-amlam	EA 545	Whole plant	Extract of whole plant is given orally once or twice a day to children as febrifuge .
<i>Plumbago zeylanica</i> Linn . (Plumbaginaceae)	Chitrak, Chitraval	EA 253	Leaves	Juice of 5-10 leaves is taken orally by the tribals as an antidote in snake-bite .
<i>Premna mucronata</i> Roxb . (Verbenaceae)	Ganiyar	EA 551	Roots	(i) Extract of either roots or stem bark is taken orally by the tribal ladies once in a day for 3-4 days to enhance fertility as well as chances of conception . (ii) Extract of bark is taken orally by the tribals to cure inflammation in stomach and also to cure dysentery .
<i>Pueraria tuberosa</i> (Roxb . ex Willd .) DC . (Fabaceae)	Vidarikand	EA 264	Tuber	Mixture of powder of <i>Pueraria tuberosa</i> tuber, whole plant of <i>Evolvulus alisnoides</i> , seed powder of <i>Papaver somnifera</i> and seed powder of <i>Citrullus lanatus</i> var . <i>lanatus</i> is prepared . One teaspoon of this powder is taken orally by the tribal men as nervine tonic and also to cure sexual debility .
<i>Sarcostemma viminalis</i> (Linn .) R . Br . (Asclepiadaceae)	Khair, Khimp	EA 95	Whole plant	Leaves of <i>Calotropis procera</i> and whole plant of <i>Sarcostemma viminalis</i> is put on light fire . The fumes evolved are inhaled by the patient suffering from lung infection .
<i>Swertia chiratia</i> (Roxb . ex Flem .) Karsten (Gentianaceae)	Cirayata	EA 552	Whole plant	(i) One cup extract of whole plant is taken orally by the tribals twice a day for 3 to 7 days in intermittent fever . (ii) Extract of whole plant is also taken as blood purifier in several skin diseases . (iii) Worms inside the nodes of stem are given orally by the local medicineman to the child patient suffering from pneumonia .
<i>Terminalia bellirica</i> (Gaertn .) Roxb . (Combretaceae)	Bahera, Veda	EA 262	Fruits	Equal quantity of powder of dried fruits of <i>Terminalia bellirica</i> , <i>Terminalia chabula</i> and <i>Phyllanthus embellica</i> are mixed and one teaspoon of this mixture is taken orally by the tribal ladies for 5 days

Continue table 1

Name of the plant species	Local name	Herbarium number	Plant parts or plant product used	Mode of administration
<i>Trapa natans</i> Linn . var. <i>bispinosa</i> (Roxb .) Makino (Trapaceae)	Singada, Singhora, Hingoda	EA 534	Fruits	to regularize the menstrual disorder . (i) 50 gm seed powder of <i>Foeniculum vulgare</i> , 50 gm fruit powder of <i>Trapa natans</i> and 50 gm sugar is given daily to pregnant ladies having problem of repeated abortions . (ii) ' Ladoos ' (local sweet) prepared from the fruit powder is eaten by the tribal ladies to cure leucorrhoea .
<i>Trichosanthes bracteata</i> (Lam .) Voigt (Cucurbitaceae)	Kakighado	EA406	Roots	One bolus of 2 to 5 gm prepared from root powder is taken with honey for one or two day by the tribal ladies in dysmenorrhoea .
<i>Trichosanthes cucumerina</i> Linn . (Cucurbitaceae)	Indrani	EA 306	Tuber	One teaspoon tuber powder is taken orally by the tribals once in a day for 3 days in colic . 1 gm leaf powder is taken orally as an antidote in snake-bite .
<i>Vitex negundo</i> Linn . (Verbenaceae)	Nagad, Nirgundi	EA 271	Root	(i) Mixture of 100 gm root powder of <i>Vitex negundo</i> , 200 gm tuber powder of <i>Chlorophytum borivillianum</i> and 100 gm tuber powder of <i>Eulophia ochreatea</i> is prepared . One teaspoon of this powder is taken orally by the tribal men with milk to cure sexual debility . (ii) One tea spoon of root powder is taken orally with milk by the tribal ladies once in a day for 10-15 days in general weakness and also in rheumatism . (iii) Paste is prepared by mixing half tea spoon root powder of <i>Vitex negundo</i> with 2 gm jaggery, and one teaspoon of clarified butter . This paste is taken orally twice a day for five days to cure leucorrhoea, gonorrhoea and also for early cure of fractured bone . (iv) Leaf extract is poured in the eyes to cure conjunctivitis . (v) The leaves are chewed to cure toothache .
<i>Withania somnifera</i> (Linn .) Dunal (Solanaceae)	Padalsi, Ashgandh	EA 81	Roots	A mixture of 250 gm roots of <i>Withania somnifera</i> , 50 gm tubers of <i>Chlorophytum borivillianum</i> , 50 gm whole plant of <i>Evolvulus alsinoides</i> and 100 gm seeds of <i>Papaver somniferum</i> is prepared . One teaspoon of this mixture is taken orally by the tribal men with one glass of milk for 15 to 30 days to cure infertility .

* EA: Herbarium number of Ethnobotany and Agrostology Laboratory

Table 2 List of animals animal products used to cure various ailments .

Name of the animal species	English name	Local Name	Animal product animal part used	Mode of administration
<i>Coraciase benghalensis</i>	Indian roller	-	Whole bird	The bird is hunted by the tribals and fed to the tribal ladies at the time of labour pain for easy delivery .
<i>Capra capra</i>	Goat	Bakari	Milk, Urine	(i) The leaves of <i>Calotropis procera</i> are fed to the goat with fodder and its milk is given to the infants to cure asthma . (ii) Paste of <i>Curcuma domestica</i> tuber is prepared in goat urine and given orally to children in fever . (iii) Paste is prepared by crushing the droppings of goat in water and applied locally in scorpion bite . (iv) Goat is sacrificed and liver is eaten by the tribals to cure night blindness . (v) 20 ml urine of goat is taken orally by the tribals as antidote in poisonous insect-bite .
<i>Pavo cristatus</i>	Peacock	Mor	Blood	Peacock is hunted by the tribals and its blood is taken orally to cure paralysis .
<i>Columbo libea</i>	Pigeon	Kabuter	Excreta	Paste prepared from droppings is taken orally by the tribals twice a day to cure typhoid .
<i>Camelus dromedarius</i>	Camel	Oont	Droppings	Ash of droppings is taken orally by the tribals in stomachache .
<i>Polistes</i> sp	Wasp	Ber	Hive	The paste of hive is applied on the body to cure pain and swelling of body .
<i>Quis aries</i>	Sheep	Bhad	Milk	Milk of sheep is used for massage by the tribals in dislocation and deformities of bones .
<i>Equus asinus</i>	Donkey	Gadha	Urine	(i) Paste of <i>Curcuma amada</i> tuber and seeds of <i>Trachyspermum ammi</i> is prepared in donkey urine . One teaspoon of this paste is given orally by the local healer twice a day for three days to cure amoebiosis . (ii) Seeds of <i>Trachyspermum ammi</i> are soaked in donkey urine for about 12-16 hours, then dried and powdered . The paste is prepared from this powder either with jaggery or <i>Sesamum oil</i> and given daily to the ladies who have a problem of abortion .
<i>Bos bubalus</i>	Buffalo	Bhans	Dung	Curd is mixed in the dung and applied locally to cure eczema .
<i>Poecillocerus strictus</i>	Grasshopper	Fadka	Whole insect	Grasshopper is crushed and given orally to patients suffering from lung infection .
<i>Bos indicus</i>	Cow	Gai	Urine	Paste of 5 leaves of <i>Ocimum tenuiflorum</i> and one seed of <i>Piper nigrum</i> is prepared in cow urine and taken by the tribals once in a day for one month or more to cure anemia .

and *Calotropis procera* which is used as antidote in dog bite (to cure rabies) and roots of *Plumbago zeylanica* and tubers of *Trichosanthes cucumerina* which are used as antidote in snake-bite. Similarly roots of *Herminium angustifolium* is used to cure tuberculosis and roots of *Inula racemosa* is used in incense. Analysis of data also indicates that 17 plant species are used by the tribals to cure various sexual diseases and other sexual disorders. The knowledge of tribal people on female contraceptive, which is one of the important informal innovations by them, is quite relevant in the present day situation. In this context *Musa paradisiaca* and *Opuntia elatior* are used by the tribal ladies to develop complete sterility while roots of *Inula racemosa* are used as contraceptive. To increase fertility in women, root or stem bark is used while fruits of *Trapa natans* are used for safe pregnancy. Hence, the role of ethnomedicinal surveys and field work is of crucial importance as some miraculous medicines are known to the tribes and aboriginal.

During the survey it was noted that the tribals in the study area in addition to plants, use some animals both vertebrates and invertebrates and their by products (curd, urine, milk, excreta, hive etc.), as source of curative, protective and preventive medicine. The accumulated data in table 2 reveals that the great majority of animal substances used in traditional medicine are readily available while some are derived from rare animals such as *Pavo cristatus* and *Coracias benghalesis*. Because of Wildlife protection act 1972, hunting of wild animals are strictly prohibited but sometimes local religious norms is superseded especially in case of saving life or in other hazardous situation. In such circumstances tribals dare to hunt even the national bird "Peacock".

An interesting fact that was observed here is that the plant products we can't consume directly can be taken indirectly through food chain. Because of toxic nature of leaves of *Calotropis procera* it is directly not given to children but milk of goat feeding on leaves of this plant is given to infants to cure asthma.

The world is facing potentially massive loss of wildlife due to over-hunting (Robinson and Bennett, 2000, 2002; Bennett *et al.* 2002) and over-fishing (Boehlert, 1996; Steneck, 1998; Jennings and Kaiser, 1998; Jennings *et al.* 2001). Transformation of ecosystems brought through economic activities has

been putting severe constraints on the availability and accessibility of specific types of plant and animal species used for medicinal purposes (Anyinam, 1995). For centuries, healers and indigenous people have been collecting medicines from local plants and animals without threatening the population dynamics of the species because of the low level of harvesting. Loss of traditional knowledge has much impact on the development of modern medicine. A great number of these natural products have come to us from the scientific study of remedies traditionally employed by various cultures (Holmstedt and Bruhn, 1983). In addition to plants, there has been increasing attention paid to animals, both vertebrates and invertebrates, as sources for new medicines. Animals have been methodically tested by pharmaceutical companies as sources of drugs for modern medical science (Kunin and Lawton, 1996), and the current percentage of animal sources for producing essential medicines is quite significant.

The list of folk medicinal plants and animals from the tribal area of Rajasthan and their utilization will provide basic data for further studies aimed at conservation, cultivation, traditional medicine and economic welfare of rural and tribal population of the region.

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