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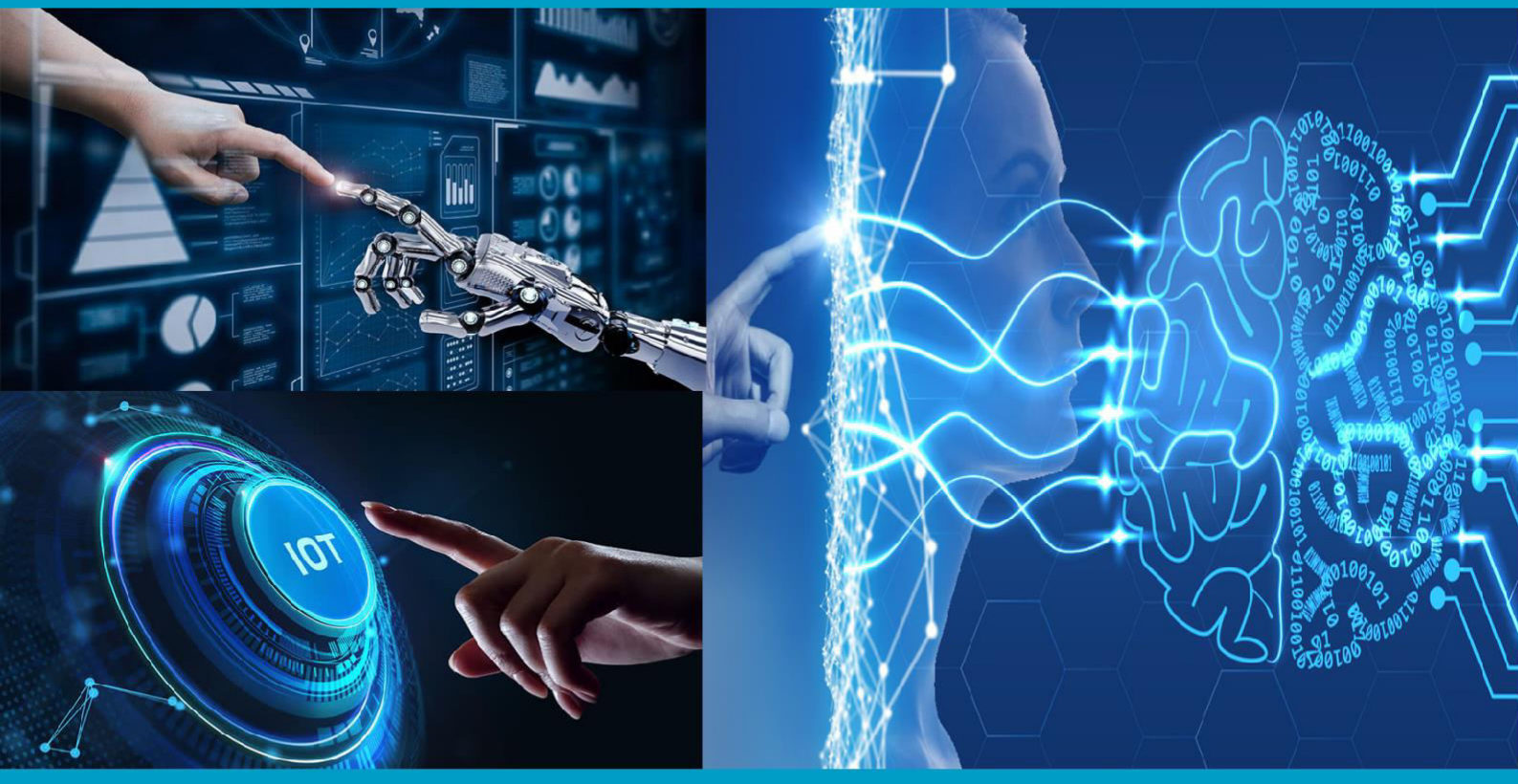

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Ethnobotanical Aspects/Studies on Medicinal Plants of Western Rajasthan

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ABSTRACT: Rajasthan ('Land of Kings')[9] is a state in northern India. It covers 342,239 square kilometres (132,139 sq mi) or 10.4 per cent of India's total geographical area. It is the largest Indian state by area and the seventh largest by population. It is on India's northwestern side, where it comprises most of the wide and inhospitable Thar Desert (also known as the Great Indian Desert) and shares a border with the Pakistani provinces of Punjab to the northwest and Sindh to the west, along the Sutlej-Indus River valley. It is bordered by five other Indian states: Punjab to the north; Haryana and Uttar Pradesh to the northeast; Madhya Pradesh to the southeast; and Gujarat to the southwest. Its geographical location is 23.3 to 30.12 North latitude and 69.30 to 78.17 East longitude, with the Tropic of Cancer passing through its southernmost tip.

Its major features include the ruins of the Indus Valley civilisation at Kalibangan and Balathal, the Dilwara Temples, a Jain pilgrimage site at Rajasthan's only hill station, Mount Abu, in the ancient Aravalli mountain range and eastern Rajasthan, the Keoladeo National Park of Bharatpur, a World Heritage Site[13] known for its bird life. Rajasthan is also home to three national tiger reserves, the Ranthambore National Park in Sawai Madhopur, Sariska Tiger Reserve in Alwar and the Mukundra Hills Tiger Reserve in Kota.

The state was formed on 30 March 1949 when Rajputana – the name adopted by the British Raj for its dependencies in the region[14] – was merged into the Dominion of India. Its capital and largest city is Jaipur. Other important cities are Jodhpur, Kota, Bikaner, Ajmer, Bharatpur and Udaipur. The economy of Rajasthan is the seventh-largest state economy in India with ₹10.20 lakh crore (US$130 billion) in gross domestic product and a per capita GDP of ₹118,000 (US$1,500).[3] Rajasthan ranks 29th among Indian states in human development index.[5] The Northwestern thorn scrub forests lie in a band around the Thar Desert, between the desert and the Aravallis. This region receives less than 400 mm of rain annually. Temperatures can sometimes exceed 45 °C in the summer months and drop below freezing point in the winter. The Godwar, Marwar, and Shekhawati regions lie in the thorn scrub forest zone, along with the city of Jodhpur. The Luni River and its tributaries are the major river system of Godwar and Marwar regions, draining the western slopes of the Aravallis and emptying southwest into the great Rann of Kutch wetland in neighbouring Gujarat. This river is saline in the lower reaches and remains potable only up to Balotara in Barmer district. The Ghaggar River, which originates in Haryana, is an intermittent stream that disappears into the sands of the Thar Desert in the northern corner of the state and is seen as a remnant of the primitive Sarasvati river.in this review we explain the ethnobotanical aspects of medicinal plants of western Rajasthan. Districts of western part of Rajasthan comprises of the districts like Jaisalmer District, Bikaner District and Barmer District.

KEYWORDS: western Rajasthan, medicinal plants, ethnobotanical aspects, tribal people, sacred

I. INTRODUCTION

The *Anogeissus latifoia* and *Anogeissus pendula* is the dominant species according to landmark viz. hills and plateau, *Boswellia serrata* occupies hill crests of Aravallis, *Terminalia arjuna* and *Syzygium heyneanum* forms riparian forests. *Sterculia urens* is not so common but distributed throughout area and *Anogeissus latifolia* is mainly found in open forest of hill range or plateau in study area. The main tree species found in this region[1] which mainly associates with *Anogeissus* species are *Tectona grandis, Lannea coromandelica, Diospyros melanoxylon, Sterculia urens, Mitragyna parviflora, Butea monosperma, Acacia ctechu, Emblica officinalis, Boswellia serrata, Bridelia squamosa, Hardwickia binata, Buchanania lanzan, Cassia fistula, Schrebera swietenioides, Pterocarpus marsupium, Holoptelea integrifolia, Terminalia tomentosa, Terminalia bellirica, Adina cordifolia, Schleichera oleosa, Careya arborea, Madhuca indica, Syzygium cumini, Bridelia retusa, Miliusa tomentosa Ougeinia oojeinensis, Lagerstroemia parviflora and Kydia calycina, Mangifera indica, Mallotus philippensis, Cochlospermum religiosum, Flacourtia indica, Bauhinia racemosa, Albizia procera, Albizia leback, Albizia odaratisima, Aegle marmelos, Acacia leucophloea, Ziziphus xylopyrus,*

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Ziziphus mauritiana, Capparis zeylanica, and Ficus religiosa, Ficus benghalensis, Ficus semicordata, Ficus rumphii, Ficus arnottiana, Dichrostachys cinerea, and Ziziphus mauritiana

Species composition of the study area at shrub and ground layer is common as in other semiarid part of western Rajasthan, the common shrub species[2] included: *Adhatoda vasica, Woodfordia fruticosa, Flemingia semialata, Clerodendrun indicum, Clerodendrun viscosum, Indigofera cassioides, Bauhinia vahlii, Millettia extensa, Mimosa hamata, Helicteres isora, Nyctanthes arbor-tristis, Grewia flavescens, Carissa carandas*,. A few climbers of this area include species of *Cryptolepis buchanani, Ichnocarpus frutescens, Rhynchosia minima, Atylosia scarabaeoides, Cocculus hirsutus, Cissampelos pareira, Ipomoea, Pergularia daemia, Pueraria tuberose, Tinospora cordifolia, Asparagus racemosus* and *Ceropegia bulbosa*

The common herb species of this area are *Alysicarpus tetragonolobus, Celosia argentea, Crotalaria hirsuta, Ipomoea sindica, Bacopa monnieri, Sarcostemma acidum, Tridax procumbens, Curculigo orchioides, Chlorophytum arundinaceum* and *Centella asiatica.* Following some species are occur in the boundaries of fields, gardens and orchards these some species included *Cardiospermum halicacabum, Coccinia grandis, Momordica dioica, Mukia maderaspatana* etc. *Utricularia aurea* is the insectivorous representatives of the area.the list of plants are shown alonwith utilities[3] as follows:-

1. *Abrus precatorius* Linn : (Local name–Chirmi, Family–Fabaceae). Decoction of root is given with almonds to increase vigour and vitality. Leaves are used for various skin diseases.

2. *Acacia nilotica* (L.) Delile : (Local name–Babul, Family–Fabaceae). Gum of the tree is highly nutritive and is useful for pregnant mothers. Raw fruits have medicinal values in women diseases, also used in tooth paste.[4]

3. *Argemone mexicana* Linn : (Local name– Pili kateli / Satayanasi, Family–Papaveraceae) : Root is used for chronic skin diseases, eye and mouth wash. Leaves for gonorrhoea, dropsy, jaundice, scabies, other skin diseases. The yellow juice is used in eye infection. The juice rubbed on the body relieves rheumatic pain. The oil from the seed is used externally for skin diseases, joint pains.

4. *Azadirachta indica* A. Juss : (Local name–Neem, Family–Meliaceae). The stem bark is bitter tonic, used to cure chronic fever. Bark is also used for wound.

5. *Calotropis procera* (Ait.) R. Br. :(Local name–Akara. Family–Asclepiadaceae). Flowers of this plant are used in piles and asthmatic problems. Latex used in tooth–ache and ringworm, and also for removing face darkness. Roots is used for spleen complaints, elephantiasis, rheumatism, protracted labour (given with black pepper). Bark is used for diaphoretic, expectorant, emetic in dysentery hempologia. Leaves are used on sores, skin disease , inflammation and rheumatic joints.[5]

6. *Datura innoxia* Mill. : (Local name–Dhatura, Family–Solanaceae). The dried leaves and twigs of the plant are smoked as an antispasmodic in asthma, whooping cough, bronchitis etc.

7. *Tephrosia hamiltonii* Drumm. : (Local name–Sarphanko, Family–Fabaceae) Plant is used as tonic, laxatic, diuretic and deobstruent. Root and seeds are insecticidal and pesticidal. Decoction of pods used as vermifuge and to stop vomiting.

8. *Tridax procumbens* Linn. : (Local name–Rukhari, Family–Asteraceae). Whole plant checks bleeding when applied on cut wounds. Leaf juice is insecticidal, pesticidal, checks heamorrhage, removes stones from urinary bladder, diarrhoea, dysentery.

9. *Xanthium strumarium* Linn : (Local name–Aadha–Shishi, Family–Asteraceae). Seeds are used for the disease Aadha–shishi, generally known as migrene pain.

10. *Zizyphus nummularia* (Brum.) Wt. : (Local name–Jhari–Bor, Family–Rhamnaceae). Leaves placed on to boils and scabies fruit are used for biliousness, astringent and cooling.

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The following medicinal plants are distributed in western Rajasthan:–

1. *Calotropis procera* : This plant mainly found in Aravallis range of western Rajasthan

2. *Azadirachta indica* : Cosmopolitan[6]

3. *Chlorophytum tuberosum* : This plant mainly found in western Rajasthan

4. *Asparagus racemosus* : Cosmopolitan

The grasslands of such habitats are dominated by tall gasses like *Aristida adscensionis, Bothriochloa pertusa, Cenchrus ciliaris, Chloris barbata, Cymbopogon martinii, Dichanthium caricosum, Digitaria adscendens, Dinebra retroflexa, Eragrostis unioloides, Heteropogon contortus, Iseilema laxum, Pennisetum hordeoides, Sehima nervosum, Themeda quadrivalvis, Tripogon jacquemontii* etc. The most common grasses of these habitats are: species of *Aristida, Cenchrus ciliaris, Chloris montana, Cynodon dactylon, Dactyloctenium aegyptium, species of Eragrostis, Melanocenchris jacquemontii, Setaria tomentosa, Sporobolus tenuissimus, Tetrapogon villosus, Tragus roxburghii, Tripogon purpurascens, Urochloa panicoides* etc *Abutilon indicum, Acacia farnesiana, Calotropis procera, Capparis decidua, Capparis sepiaria, Clerodendrum phlomidis, Dichrostachys cinerea, Ficus palmata, Kirganelia reticulata, Lantana camara, Leptadenia pyrotechnica, Mimosa hamata, Opuntia elatior* and *Ziziphus nummularia* etc

A large number of undershrubs also grow in the wastelands, the most common ones are: *Cassia auriculata, Cassia occidentalis, Desmodium gangeticum, Malvastrum coromandelianum, Pavonia zeylanica, Pupalia lappacea, Sida cordifolia, Sida ovata, Triumfetta pentandra* and *Xanthium strumarium* etc

The typical weeds of the winter crops are*: Ageratum conyzoides, Anagallis arvensis, Asphodelus tenuifolius, Chenopodium album, Cynodon dactylon, Euphorbia dracunculoides, Fumaria indica, Lepidium sativum, Lathyrus aphaca, Melilotus alba, Melilotus indicus, Oxalis corniculata, Polypogon monspeliensis, Striga angustifolia* etc.

Tribal's are the oldest ethnological groups which live away from the civilized world, preferably in forest areas, follows primitive customs and occupation, have, common language and social culture and are economically dependent on each other. India has over 67 million of 227 ethnic groups. In habiting in about 5000 forest villages or leading of numeric life in the forever. About people belonging to 550 tribal which communities representing 7.78 per cent of the total Population of the country, it is spread over 18.7% of total area of the country. They have typical problems of their own due to their socioeconomic status, environment, historical experiences and extent of political articulations, on account of these factors ethnically as well as economically and culturally, tribals are at different stages of sociopsychological orientation and politico-economic development, The total tribal population of Rajasthan state is 92,38534 which is 13.5% percent of the total population of this state. The tribal of Western Rajasthan constitute about 8.85% of the total population of tribal in India. There is a significant percentage (53%) of Meena tribal in Rajasthan. The literacy of tribal is in Western Rajasthan is 10.27% only. The Scheduled tribes have attained a decadal change of 43.6 % during the period. Several tribes inhabited in the state of Western Rajasthan viz. Bhils, Bhil-Meena, Meena, Damor, Garasia, Sehariya (major tribes), Dhanka, , Kathodia,, Patelia, Naikda, Koli Dhor, Kokna (minor tribes) Besides these, there are some nomadic, seminomadic and denotified communities also found, Nomadic communities are Sansi, Kanjar, Kalbelia Bauri, Bagri etc., whereas Semi-nomadic communities are Rebari, Jogi, Masani, Bhat etc. and denotified communities include Gadia Lohar "Banjara, which wander from place to place within the state as well as other parts of the country and have their own cultural, social and economic status.[7]

II. DISCUSSION

Tribals and traditional communities of western Rajasthan collect and store the dried clumps and leaves of crop plants for their pet animals after harvesting the crop. More than hundred plant species (herb, shrub & trees) are used as medicines.

1. *Abrus precatorius:* Leaves are chewed for 2-5 days to cure blisters in the mouth, and seeds are used as an antifertility drug both by male and female. Two to four seeds orally taken with water during menstruationes prevent conception forever, an effective contraceptive. [8]

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2. *Abutilon indicum:* Leaves are grounded with milk and given orally to cure dysentery. Decoction of leaves is given for urinary troubles.

3. *Acacia catechu:* The gum is used to make laddoo. The pellets made with kattha are taken in stomachache. Gum powder is mixed with ghee and unrefined sugar is kept in an earthen pot for 5-7 days. This is taken three days before menses for conception.

4. *Acacia leucophloea:* Crushed stem bark is soaked in water overnight and given orally in the morning to increase sexual potency in males and for menstrual complaints in females.

5. *Acacia nilotica:* Bark and leaf paste is applied on cuts and wounds.The stem bark is chewed orally with salt or boiled in water & taken orally or gargled to cure cough and mouthsores. The pod paste mixed with raw sugar is taken empty stomach in the morning by ladies to cure leucorrhoea. Stem bark crushed with *Dalbergia sissoo* leaves and sugar/batasha, is stored in an earthenpot overnight and taken empty stomach in the morning to get relief in menorrhagia.[9]

6. *Actiniopteris radiata:* Whole plant dipped in water for 12 hours is pounded with milk and taken to avoid nocturnal emission and also as tonic. Leaf juice is taken against acidity.

7. *Adansonia digitata:* Pulp of fruit is sour in taste so it is preferable as a vegetable directly and acid- alkalic balance can be maintained in body.

8. *Adhatoda zeylanica:* The leaf sap contains very important alkaloid (vacanine). Leaves of this plant contain insecticidal properties. The decoction of leaves is given orally to cure asthma and cough.

9. *Adina cardifolia:* Fresh bark is grind with brown sugar and taken for stomachache. Fresh stem bark juice is taken in rheumatism; leaves are applied over swollen portion to remove pain and swelling.

10. *Aegle marmelos*: Fruit pulp is taken to cure constipation, chronic dioarrhea and dysentery. Leaf ash mixed with curd and black salt, is given orally to cure dysentery. Root crushed with sugar and eaten by women against protrusion of uterus. The pulp of unripe fruits is cut into pieces; dried, powdered and 1 tbsp powder is taken twice a day to cure diarrhoea.[10]

11. *Ageratum conyzoides*: Dried powdered plant paste applied locally on burns and skin eruptions. Leaf juice is given orally with water in conjunctivitis.

12. *Alangium salvifolium*: Root extract and juice is an abortifacient. The helps in reducing blood pressure, so it is preferable for high blood pressure patients, by using 2tbsp bark powder with cold water for a month continuously. Stem bark of plant is crushed with *Bombax* flowers and this mixture is taken 2 times a day orally in suitable amount to cure portrusion of uterus.

13. *Albizia lebbeck*: Fresh leaves are fermented in an earthen pot and used to wash eyes for treating conjunctivitis (eye flu) and this plant also has pesticidal properties. Paste of stem bark and leaves is applied locally on ulcer, insect bite and scorpion sting. The seeds are crushed into paste and applied in eyes to get rid from cataract. [11]

14. *Allium sativum:* Crushed bulbs are given twice a day for seven days in fever and cough. The bulblets are eaten raw in arthritis, rheumatism and high blood pressure. Paste of bulblets is applied locally to the painful part of body and ringworm. The leaf juice is applied locally on ringworm. Bulblets are crushed into paste with the leaves of Holoptelia integrifolia and add 2-3 drops of lemon juice or tobacco's water is tied locally on ringworm.

15. *Aloe barbadensis:* Pulp of leaves is used in liver disease and for reducing unwanted deposition of fat in the body. Pulp is mixed with turmeric powder, made into poultice and tide locally for healing cuts, wounds, boils and pimples. Crushed leaves applied locally on Guinea worm. [27]

16. *Amaranthus caudatus:* Seed are cooked like rice and relished by the tribals. Leaves of this plant eaten as vegetable, which helps to cure constipation problem.

17. *Ammannia baccifera:* Fresh leaves are bruised and applied to burnt parts of the body.

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18. *Annona squamosa:* Plant seeds in powdered form along with leaves of Plumbago zeylanica are used to cause abortion. The bark powder is applied externally for wound healing.

19. *Anogeissus latifolia:* Bark directly eaten for stomachache and bark extract is taken orally by the tribals as antivenom in snake bite. The gum is used during winter season as well as after delivery in the form of Laddoo, to cure the damaged tissue during delivery. [12]

20. *Antigonon leptopus:* Seeds are edible like popcorn, so it is used as a famine food. Leaves are crushed with sugar and applied on blisters twice or thrice for a day.

21. *Argemone mexicana:* Leaves decoction is used to cure malaria fever, ulcer and skin problems. The juice of the plant is used in jaundice and skin problems. Decoction of stem and leaves is given thrice a day to treat gastralgia, asthma and cough. Paste of seed is smeared over fractured bone or seed powder mixed with oil and massaged on affected area. Seed paste applied on swollen bodypart to confirm fracture. [26]

22. *Aristolochia indica:* Paste of fresh leaves is applied in acute rheumatic pain, sting of scorpion and insect bite. Root paste is taken orally with water against collapse and snake bite.

23. *Azadirachta indica:* Decoction of leaves is used to wash affected eyes thrice a day for treating conjunctivitis till cured. Juvenile leaves are eaten directly in month of March is very effective for blood purification. The leaves are boiled in water and used for bathing to cure scabies, boils, pimples, eczema and other skin diseases. Juvenile leaves crushed with the leaves of Lawsonia,[25] black pepper and smeared over forehead to get rid of headache. The gum mixed with honey and smeared on chest to relieve pain. The smearing of warm gum is effective against pneumonia and skin diseases. The bark is boiled in water and this water is used for bathing to cure prickly heat.

24. *Barleria cuspidata:* The twig of plant is used as a tooth brush for strengthen teeth and gums. Leaf juice of this plant mixed with cooking oil and rubed on painful areas, it relives from muscular pain. [13]

25. *Barleria prionitis:* Leaf decoction is given during cough. Roots and leaves are chewed to relieve toothache and blisters. Fresh leaves boiled and made into a paste is tide with a cotton bandage and filtrate is poured on affected part twice a day for a month for treating “lakwa” (paralysis). Paste of roots mixed with goatmilk is given to treat rheumatic fever (Plate-12).

26. *Bauhinia purpurea:* Decoction of flower buds used orally for constipation problems, while tender bark paste is applied on small pox externally.

27. *Bauhinia variegata:* The flowers are used to cure diarrhoea and both leaves and flowers are eaten. Plant bark is used for the treatment of leprosy.[24] Bhil tribe uses its leaves as a laxative. Leaf powder is mixed with musterd oil and applied externally on infaction behind the flowing ears.[14]

III. RESULTS

Around one hundred eleven plant species are used by tribal and traditional communities for 77 diseases. Most common diseases are abdominal disorders, cough and cold, diarrhoea, skin diseases, rheumatic pain, dysentery, fever, toothache and wounds.

The various modes of administration are as follows: (1)Plant part made edible either by powdering, burning or frying and mixing with other ingredient or food. (2) Raw plants/ parts/ products. (3) Extract by crushing or pounding fresh drug or slicing it. [17] (4) Juice /simple rubbing of plant part. (5) Poultices. (6) Decoction/ gargle. (7) Ash of plant. (8) Paste. (9) As tooth brush/ chewing. (10) Suppositories. (11) Herbal bath (bath with water in which the drug is crushed or boiled). (12) Tying drug to body part. (13) Vapour bath by burning/ boiling drug. (14) Oils. (15) Cooking as vegetables, laddooes etc. Present findings indicate that different folk inhabitants of the area are conscious for the health of their livestocks, as they depend on them to substantiate their livelihood. Most common diseases amongst these animals are parasitic diseases that may be ecto or endoparasitic.[16] Main parasites are tape worm; hook worm, lice, ticks, liver fluks etc. Indigestion and diarrhoea are the major diseases related to diet. Infection in hooves and retention of placenta after delivery are very common amongst animals.[23] Plants like *Piithecellobium dulce, Butea monosperma, Cordia dichotoma, Abrus precatorious, and Lawsonia inermis* are used similarly by other tribal and traditional

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communities in other parts of country. The traditional knowledge of above plant species to cure a particular aliment of livestock is confined to primitive people and passes from one generation to another. Therefore, detailed phytochemical and pharmacological studies are required for positive exploitation and wider application of these ethnoveterinary drugs.[15]

IV. CONCLUSIONS

An all over sixty one plants are used as wild edible plants and thirty eight plants are used in famine condition. One hundred and five plants are in fodder; while one hundred and eleven plants are used to cure several disease treated using plant-based formulations are body heat, boils, pimples, cough, diarrhoea, fever, mouth sore, dysentery, rheumatism, scorpion sting, toothache and wounds. Most of the plants surveyed for medicinal values in the study area are used singly. [18]The various modes of administration like decoction, juice, ash of plants, poultice, paste, powder and extracts by crushing fresh plant material or slicing are used. In certain diseases, warmed leaf smeared with oil/ ghee is applied directly over the affected body part. Similarly, plant products such as latex are used. The herbal preparation is taken orally/applied locally/ boiled in water and is used for bathing.[22] Some plants are used to prepare laddooes and eaten as medicine for strength. Thirty three plants are used in medicinal and Ethnoveterinary diseases in this area. Seventeen plant species are used in vices as liquor and eighteen plant species are used in intoxicants and masticatories. Thirteen plant species are related with gum, resin, tannin production and nine plants are fish poisoning plants, which makes a great value in tribal daily life. [19]Different sacred groves of western Rajasthan are useful as medicinal. During present investigation we found six sacred goves, which are enriched with protected vegetation by local peoples and twelve plant species are sacred which are worshipped either on special occasions or daily, [21]while seven plant species are used in sacred pyre. In the present study all aspects of ethnobotany have been taken into consideration. However, the surveyed area being limited to a tehsil leaves a vast scope for hunting out further ethnobotanical treasure from the tribes. The quantitative phytochemical analysis of medicinal and nutritional plants can further enrich the drug industry with new drug resources and sources of high nutrition for the benefit of mankind.[20]

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