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Ethnobotanical Survey of Rajasthan - An Update

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Abstract: Plants have been used both in the prevention and cure of various diseases of humans and their pets. With the advent of human civilization, many systems of therapy have been developed primarily based on plants. Ayurveda, Homeopathy, Sidda, Unani, etc. are our traditional systems of medicines. The plant-based traditional medical systems continue to provide the *primary health care* to more than three-quarters of the world's populace. In India, the use of plants for medicinal treatment dates back to 5000 years. It was officially recognized that 2500 plant species have medicinal value while over 6000 plants are estimated to be explored in traditional, folk and herbal medicine. An important prerequisite for proper utilization of raw materials of the country is the survey of its natural resources and the preparation of an inventory. It is necessary that we should have full knowledge regarding the occurrence, frequency, distribution and phenology of various plants for their proper utilization. The forests and arid regions of Rajasthan have great potentiality both from the economic and botanical points of view. This paper reviews the work done so far in the ethnobotany of Rajasthan.

Key words: Bhils % Desert % Ethnobotany % Herbal medicines % Tribes

INTRODUCTION

Ethnobotany is the study of the relationship between plants and people: From "ethno" - study of people and "botany" - study of plants. Ethnobotany is considered a branch of ethnobiology. Ethnobotany studies the complex relationships between (uses of) plants and cultures. The focus of ethnobotany is on how plants have been or are used, managed and perceived in human societies and includes plants used for food, medicine, divination, cosmetics, dyeing, textiles, for building, tools, currency, clothing, rituals, social life and music.

Ethnobotany is a multidisciplinary science defined as the interaction between plants and people. The relationship between plants and human cultures is not limited to the use of plants for food, clothing and shelter but also includes their use for religious ceremonies, ornamentation and health care [1].

In the past, ethnobotanical research was predominately a survey of the plants used by villagers. A trained botanist identified the plants and recorded their uses. Sometimes an anthropologist was present to translate the disease descriptions, but rarely was a physician available to identify the disease. The results generated a list of plants and their uses which was published in a professional journal, usually in the country of the scientist. Nothing was communicated or returned to the cultural group in exchange for their participation in the survey, nor was any environmental or cultural status or concerns included in the survey.

Basic quantitative and experimental ethnobotany includes basic documentation, quantitative evaluation of use and management and experimental assessment. Today, ethnobotanical surveys include applied projects that have the potential to ameliorate poverty levels of these people, allowing them to make more educated decisions about their future directions. These new approaches enhance the quality of the science, provide compensation for the cultural groups and take into account environmental concerns. This modern approach is based on an interdisciplinary team usually composed of an ethnobotanist, an anthropologist, an ecologist and a physician. Some of these team members are remote area colleagues who have arranged the details of the expedition as well as the contractual agreements for reciprocal programs of the village or community.

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Brief History of Ethnobotany: Harshberger, [2] defined Ethnobotany as "the study of the utilitarian relationship between human beings and vegetation in their environment, including medicinal uses". Though the term "ethnobotany" was not coined until 1895 by the US botanist John William Harshberger, the history of the field begins long before that. In AD 77, the Greek surgeon Dioscorides published "De Materia Medica", which was a catalog of about 600 plants in the Mediterranean. It also included information on how the Greeks used the plants, especially for medicinal purposes. This illustrated herbal contained information on how and when each plant was gathered, whether or not it was poisonous, its actual use and whether or not it was edible (it even provided recipes). Dioscorides stressed the economic potential of plants. For generations, scholars learned from this herbal, but did not actually venture into the field until after the Middle Ages.

In 1542, Leonhart Fuchs, a Renaissance artist, led the way back into the field. His "De Historia Stirpium" cataloged 400 plants native to Germany and Austria. John Ray (1686-1704) provided the first definition of "species" in his "Historia Plantarum": a species is a set of individuals who give rise through reproduction to new individuals similar to themselves. In 1753 Carl Linnaeus wrote "Species Plantarum", which included information on about 5,900 plants. Linnaeus is famous for inventing the binomial method of nomenclature, in which all species get a two part name (genus, species).

The 19th century saw the peak of botanical exploration. Alexander von Humboldt collected data from the new world and the famous Captain Cook brought back information on plants from the South Pacific. At this time major botanical gardens were started, for instance the Royal Botanic Gardens, Kew. Edward Palmer collected artifacts and botanical specimens from peoples in the North American West (Great Basin) and Mexico from the 1860s to the 1890s. Once enough data existed, the field of "aboriginal botany" was founded. Aboriginal botany is the study of all forms of the vegetable world which aboriginal peoples use for food, medicine, textiles, ornaments, etc.

The first individual to study the emic perspective of the plant world was a German physician working in Sarajevo at the end of 19th Century: Leopold Glueck. His published work on traditional medical uses of plants done by rural people in Bosnia (1896) has to be considered the first modern ethnobotanical work. The term "ethnobotany" was first used by a botanist named John W. Harshberger in 1895 while he was teaching at the University of Pennsylvania. Although the term was not used until 1895, practical interests in ethnobotany go back to the beginning of civilization when people relied more on plants as a way of survival. Beginning in the 20th century, the field of ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual reorientation. This is also the beginning of academic ethnobotany. The founding father of this discipline is Richard Evans Schultes.

Today the field of ethnobotany requires a variety of skills: botanical training for the identification and preservation of plant specimens; anthropological training to understand the cultural concepts around the perception of plants; linguistic training, at least enough to transcribe local terms and understand native morphology, syntax and semantics. Native healers are often reluctant to accurately share their knowledge to outsiders [3].

The biological diversity of our world is great and we have only begun to investigate her potential. In some areas diversity may be more valuable in its natural state than when used for pasture or timber [4]. Methods to identify medicinal plant include random screening, taxonomic collecting (sampling by botanical family), or ethnobotanical collecting. It has been shown that ethnobotanically-derived compounds have greater activity than compounds derived from random screening and therefore a greater potential for product development.

Review of Literature for Ethnobotanical Survey of Rajasthan: In India much literature, relevant to ethnobotany can be traced in the vedic literature, Charak and shusruta and Charak samhita appeared as the most important works. A large portion of this country was covered with forests which yielded a number of medicinal plants. These plants were initiated extensively in Ayurvedic system of medicine since many centuries.

Very little organised work had been done in the country till about twenty years ago. Organised field work and other studies in the subject were started in the Botanical Survey of India. Also there has been a resurgence of interest developed in ethnobotanical research in various institutions. Dr. E.K. Janaki Aromal initiated researches on ethnobotany in BSI. She studied food plants of certain tribals of South India. From 1960, Dr. S.K. Jain from BSI started intensive field work among the tribals of Central India. He devised methodology for ethnobotany particularly in the Indian context. The publications from this group in the early sixties triggered the ethnobotanical activity in many other centres, particularly among botanists, anthropologists

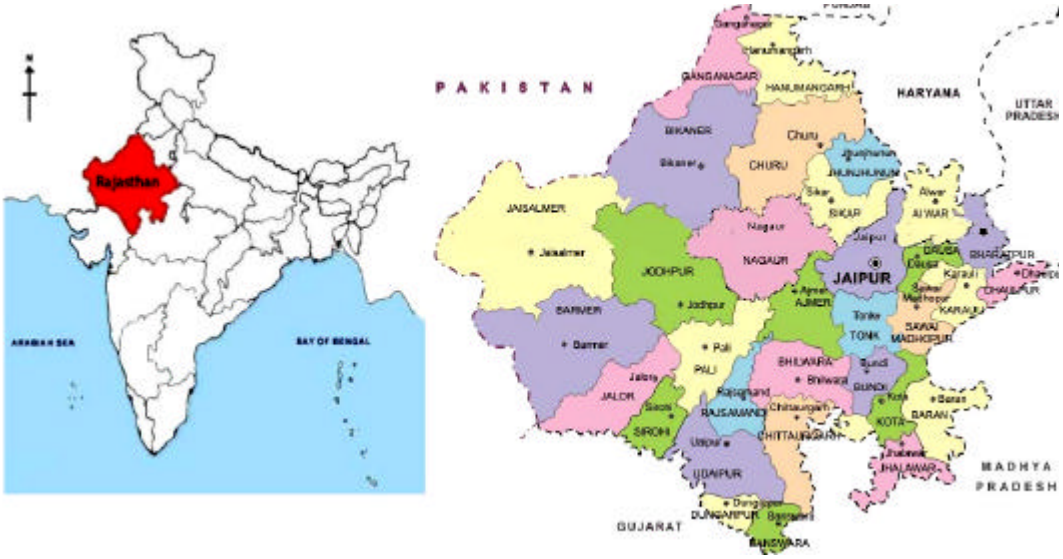

Fig. 1: Study Area

Fig. 2: Various tribes of Rajasthan

and medical practioners etc. in India. During the last four decades similar work has been initiated at various centres Sucn as National Botanical Research Institute at Lucknow, National Bureau of plant Genetic Resources (NBPGR) at Delhi, Central Council of Research in Unani Medicines, Central Council of Research in Ayurveda and Siddha (CCRAS) and in some other institutions.

As a result of this renewal of interest in ethnobotany much work has been done in different areas including Rajasthan (Fig. 1). The tribes which were studied includes Asurs, Bhils, Bhunji, Chenchus, Garos, Gonds, Hoes, Jaintias, Karbis, Khasis, Konds, Khols, Lodhas, Mahlis, Mundas, Marias, Mishmees, Mompas, Miris, Nagas, Nicobaries, Onges, Oraons, phanias, Rotha, Saoras, Santals and Shompens (Fig. 2).

Very little work on the ethnobotany and economic utilization of local plant resources has been done in Rajasthan in spite of the favourable conditions. Southern Rajasthan has comparatively rich flora and various tribes with a rich cultural heritage. Long back, King (1869, 1869) published two papers on the famine foods, of Marwar [5,6]. An account of *Acacia* was given by Nathawat and Deshpande [7] and Gupta [8]. Vyas and Gupta [9] listed some medicinal plants occurring in Alwar [9]. Raheja and Sen [10] enumerated the plant resources in the developmental prospective of Rajasthan. Chopra *et al*., [11] referred to some of Medicinal plants of Indian arid zone. Vernacular names of the useful plants of the regions were given by Gupta and Dutta [12]. Survey of *Salvadora oleoides* and *S. persica* as two important oil yielding plants was made by Gupta and Saxena [13]. Bhandari [14] gave a detailed account of the famine foods of Marwar. Dixit and Mishra [15] listed some less known medicinal plants of Ajmer forest division. Srivastava [16] gave an account of Forest resources of Rajasthan. Singh and Shetty [17] surveyed the natural resources of Rajasthan Desert. Paroda [18] explored plant resource of Indian arid zones for industrial uses.

Sen and Bansal [19] gave an accout of food plant resource. Amalraj [20] described same promising-plants of Rajasthan. Singh and Pandey [21] enumerated fiber yielding plants of Rajasthan. Joshi [22] gave an account of the ethnobotany of the Bhil tribe of Rajasthan. Billore [23] described the medicinal plants used by the Bhils of Banswara district and some medicinal plants of Ajmer forest division. Khan [24] discussed the anticancer plants of Banswara district. Shekhawat and Anand [25], Sebastian and Bhandari [26] and Sebastian [27] gave an ethno botanical profile of the Indian desert plants used in veterinary medicines by the Bhils.

Singh and Saxena [28] reported Sacred Groves in Shekhala Village in Rajasthan. Katewa *et al*. [29] conducted a floristic survey of ethnomedicinal plants occurring in the tribal area of Rajasthan. An ethnobotanical survey of tribal area of southern Rajasthan was carried out during the year 2001–2002 for ethno-sexicological herbal medicines by Jain *et al*. [30]. Traditional knowledge on zootherapeutic uses by the Saharia tribe of Rajasthan, India was reported by Mahawar and Jaroli [31]. Ethnomedical uses of biodiversity from Tadgarh-Raoli wildlife sanctuary of Rajasthan was reported by Jain *et al*. [32]. Ethnobotanical survey of Sariska and Siliserh regions from Alwar District was reported was reported by Jain *et al*. [33].

RESULTS AND CONCLUSIONS

The traditional knowledge system in India is fast disappearing. So there is an urgent need for inventorying and recording all ethnobotanical information among the diverse ethnic communities. In this paper work on ethnobotanical uses of plants belonging to Rajasthan been documented for their food value and their interesting therapeutic properties for various ailments. Various plants have dual significance; firstly they can be promising future food, secondly these medicinal tuberous plants can have some active constituent for future pharmaceutical analysis.

Various results show that gender and age class differ in their traditional knowledge with regard to medicinal plants reported. Males above 50 year of age had more traditional knowledge about medicinal plants and their uses than females. This may be attributed to their involvement in trade related activities. In most of the cases the older people were noted as being better informants and the vivid reason for this may be their personal experience of using these plants since old times.

We learned through the survey that local people are still dependent on plant resources for treatment of various ailments, but this kind of dependence is decreasing. This is likely due to multiple reasons. One such reason is lack of belief of the young generation in the traditional medicine systems and increasing use of allopathic medicines due to their availability and efficacy. Another reason likely is the harvest by drug manufacturers especially in areas near settlements and pastures, leaving behind very little for access by local communities.

Arisaema tortuosum, Costus specious, Eulophia ochreata, Leea indica, Leea macrophylla, Pureria tuberosa, Corallocarpus epigaeus etc. have medicinal value belonging to rare category while *Ceropegia bulbosa, Ceropegia tuberosa and Pureria tuberosa* having food value, but due to overexploitation now they have become rare and endangered and there is great threat of extinction. Genus *Dioscorea* which was much abundant previously has been kept into rare category (Table 1).

Many plants are cultivated by tribals abundantly and sold in nearby market. These plants have much nutritional valve. *Ceropegia bulbosa Ceropegia tuberosa,, Colocasia esculenta, Curcuma amada, Dioscorea bulbifera, Dioscorea hispida, Dioscorea tomentosa, Daucas carota, Iphigenia indica, Nelumbo nucifera, Pupalia atropurpuria, Pureria tuberose,*

Table 1: Plants of Rajasthan with ethnobotanical use

Edible plants	*Ceropegia bulbosa, Ceropegia tuberosa, Curcuma amada, Colocasia esculenta, Dioscorea bulbifera, Nelumbo nucifera, Pupalia atropurpuria, Pureria tuberose, Raphanus sativaus, Trapa natans*
Medicinal plants	*Ampelociessus latifolia, Asparagus racemosus, Arisaema tortuosum, Costus specious, Curculigo orchioidies, Crinum asiaticum, Ceropegia bulbosa, Ceropegia tuberosa, Chlorophytum tuberosum, Corallocarpus epigaeus, Colocasia esculenta, Curcuma amada, Cayratia trifolia, Dioscorea bulbifera, Dioscorea hispida, Dioscorea pentaphylla, Dioscorea tomentosa, Daucas carota, Eulophia ochreata, Euphorbia fusiformi, Gloroisa superba, Globba marantina, Leea indica, Leea macrophylla, Langenandra toxicaria, Momordica dioica, Momordica balsamina, Mirabilis jalapa, Nelumbo nucifera, Pureria tuberose, Raphanus sativaus, Ruellia tuberosa, Sauromatum venosum, Tacca leontopetaloides, Trichisanthes cucumerina, Urginea indica, Withania somnifera, Zingiber officinale*
Spice plants	*Curcuma amada, Zingiber officinale,*
Poisionous plants	*Crinum asiaticum*(Bulb), *Gloroisa superba* (Tuber), *Withania somnifera* (seed), *Dioscorea bulbifera* (Tuber), *Urginea indica* (Bulb)
Ornamental plants	*Crinum asiaticum, Gloroisa superba*

Table 2: Plants of Rajasthan used as Ethano-medico practices

Disease	Plant Species
Abscess	*Arisaema tortuosum*
Anti cancerous	*Leea macrophylla*
Antidote	*Ampelocissus l atifolia, Ceropegia tuberose, Arisaema tortuosum, Curculigo orchioidies, Cayratia trifolia, Curcuma amada, Trichisanthes cucumerina*
Antinematodal	*Arisaema tortuosum, Curculigo orchioidies, Gloroisa superba, Pureria tuberose, Urgenia indica*
Anti tumour	*Sauromatum venosum*
Asthma	*Globba marantina, Dioscorea bulbifera*
Body ache	*Costus specious, Curcuma amada, Leea indica, Leea macrophylla*
Boils	*Raphanus sativus*
Bone fracture	*Arisaema tortuosum, Chlorophytum tuberosum, Curcuma amada, Cayratia trifolia*
Constipation	*Curculigo orchioidies*
Contra receptives	*Dioscorea bulbifera*
Diabetes	*Asparagus racemosus, Momordica dioica, Withania somnifera*
Dysentery	*Curcuma amada, Withania somnifera, Leea macrophylla*
Dyspepsia	*Ampelocissus latifolia*
Ear-ailment	*Costus specious, Crinum asiaticum,Ceropegia bulbosa*
Gastrointestinal disorder	*Zingiber officinale*
Gout	*Ampelocissus latifolia*
Hair lengthening	*Colocasia esculenta, Momordica dioica*
Health tonic	*Ampelocissus latifolia, Chlorophytum tuberosum, Daucas carota*
Headache	*Tacca leontopetaloides*
Indigestion	*Ampelocissus latifolia*
Irregular menstruation	*Raphanus sativaus*
Kidney stone	*Ceropegia bulbosa*
Lactogogue	*Asparagus racemosus*
Leuchorrhoea	*Chlorophytum tuberosum, Curculigo orchioidies*
Leukemia	*Eulophia ochreata*
Pyrexia	*Urginea indica*
Rheumatism	*Withania somnifera, Costus specious*
Sexual delibity	*Leea macrophylla, Daucas carota*
Sexual vigour	*Curculigo orchioidies*
Skin disease	*Zingiber officinale*
Stomach ache	*Dioscorea pentaphylla, Ruellia tuberosa*
Sunstroke	*Corallocarpus epigaeus*
Tuberculosis	*Ampelocissus latifolia, Lagenandra toxicaria*
Typhoid	*Corallocarpus epigaeus*
Vaginal uterine prolapse	*Asparagus racemosus, Gloroisa superba, Withania somnifera*
Wound healing	*Crinum asiaticum*

Fig. 3: Ethano-medico uses of Plant parts to heal various diseases by tribal peoples

Raphanus sativaus, Zingiber officinale are wild tuberous plants which are used by tribals as food. If proper strategies are proposed then this plants may become the part of tribal economy. Some tuberous plants e.g. *Curcuma amada and Zingiber officinale* are widely used as spice and condiment not only by the tribals but also by the urban peoples. Along with food value some plants e.g. *Crinum asiaticum* and Gloroisa *superba* now have become beautiful ornamental plants but both are rare plant and found only in protected forest.

Some plants are poisonous too e.g. *Gloroisa superba, Crinum asiaticum, Urginea indica,, Withania somnifera,,* (Seed), *Dioscorea bulbifera* (Table 1). It is reported that being poisonous they have great medicinal value too. The tribal people have much knowledge about the detoxification; they use *Dioscorea bulbifera, Urginea indica* after detoxification, they either keep them overnight in running water or boil with water and after that they cook them. Nearly about all plants are reported to be medicinal having medicinal value of curing various ailments (Table 2). *Arisaema tortuosum, Curculigo orchioidies, Ceropegia tuberoae, Curcuma amada, Cayratia trifolia Trichisanthes cucumerina, Sauromatum venosum* are widely used as antidote. Several plant species e.g. *Curcuma amada, Cayratia trifolia, Arisaema tortuosum and Chlorophytum tuberosum* are used for curing bone fracture.

Tacca which is reported for the first time just little while ago in Rajasthan, (India) (Sharma, 2005), has medicinal value of curing severe headache or migraine. *Leea macrophylla* is reported to be anti cancerous.It is also observed that some tuberous plant species are used by tribals to cure various sexual disease, menorrhage to regularize menstruation, to increase fertility etc. the knowledge of tribals about contra receptive, which is one of the informal innovation by them, is quite relevant in present day situation. In this context Gloriosa *superba* used to develop sterlity. *Curculigo orchioidies* incareas sexual vigor. *Dioscorea bulbifera* is used by tribal ladies as contra receptive.

Arisaema tortuosum, Ampelocissus latifolia, Curculigo orchioidies Corallocarpus epigaeus Colocasia esculenta, Curcuma amada, Dioscorea bulbifera, Dioscorea pentaphylla, Eulophia ochreata, Leea macrophylla, Withania somnifera, Ruelia tuberosa are common important plants which are used by tribals to cure various ailments related to digestive tract like constipation, indigestion, abdominal pain, dysentery etc. Skin diseases like wounds, tumors, boils, sunburn, cut, injury and carbuncle are among tribals. Few important plant species which cure these diseases are *Sauromatum venosum, Cayratia trifolia, Raphanus sativaus, Zingiber officinale, Corallocarpus epigaeus and Crinum asiaticum.* Most of the skin diseases may be cured by

application of a poultice or a paste which is applied locally. Various ailments related to respiration like cough, cold, tuberculosis and asthma are cured by the tribals either using single herb or mixture of more than one herb i.e. *Costus specious, Dioscorea bulbifera, Dioscorea pentaphylla, Urginea indica, Ampelocissus latifolia* (Fig. 3). Stones in the urinary tract, bladder, kidney and inflammation in urinary tract are some common disease of urinary system in the tribals of the study area which is cured by *Ceropegia bulbosa. Eulophia ochreata* is reported for curing fever. *Corallocarpus epigaeus* is used for curing typhoid. *Costus specious, Crinum asiaticum, Ceropegia bulbosa are* widely used to cure various ailments of ear. *Asparagus racemosus, Cayratia trifolia and Withania somnifera* are widely used for curing diabetes. *Ampelocissus latifolia* is effective against gout. *Costus specious, Euphorbia fusiformis, Withania somnifera are* used against rheumatism. *Ampelocissus latifolia, Chlorophytum tuberosum, Daucas carota* are used as tonic. Due to absence of proper hygiene, tribals are infected by nematodes, so they use *Arisaema tortuosum, Curculigo orchioidies, Gloroisa superba, Urginea indica, Pureria tuberose* against nematodal infection.

It is observed that the dosages and duration of medicine generally depend on the intensity of the disease and age of patient. It is observed that tribal harvest that plant part used for medicinal purpose at particular growth period or season e.g. before flowering and fruiting period etc. presumably to obtain maximum concentration of the active principle. As tuberous plants remain in dormant phase and have a limited period for completing their life cycle, tribal preserve the tuber for various remedies, which is harvested in their particular period. Hence, the tribals have a specified way of collecting the herbs, preparing and applying the medicine. It is observed that single plant species or a combination of different plant species is used for curing various diseases.

Ethnobotanical research can provide a wealth of information regarding both past and present relationships between plants and the traditional societies. Investigations into traditional use and management of local flora have demonstrated the existence of extensive local knowledge of not only about the physical and chemical properties of many plant species, but also the phenological and ecological features in the case of domesticated species. In addition to its traditional roles in economic botany and exploration of human cognition, ethnobotanical research has been applied to current areas of study such as biodiversity prospecting and vegetation management. It is hoped that, in the future, ethnobotany may play an increasingly important role in sustainable devolopment and biodiversity conservation. In interaction with the traditional areas of science, ethnobotany gives out several interrelated and interdisciplinary subjects link *ethnomedicine, ethnoarchaeology, ethnobryology, ethnoecology, ethnoagriculture, ethnonarcotics, ethnopharmacology,* etc.

Most of plants having ethno botanic use have been categorized into rare and endangered. This lack of effort to sustain resources may result in their depletion from natural habitats. There is a great need to create awareness among the indigenous communities about endangering medicinal plants, if over exploited to meet market demand.

We think that the present status of the economically and medicinally important plants of the study area needs to be determined in order to develop plans for their protection. Improved awareness of conservation issues is needed. Proper documentation of indigenous knowledge about the plants could be supportive in achievement of objectives. Local cultivation of medicinal plants and other economic species can play an important role in economic development of the area. For sustainable and long term conservation of natural resources of the area; there is a need to actively involve the quiescence of local people in evaluation, planning, implementation and monitoring processes as they are the best judges of the area.

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