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Ethnobotany in India: Era of Dr. S.K. Jain and the way forward

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Abstract
Evolution of humanity and intimate relationship of human being with the plants remains interesting subject for scholars to understand and research the whole science behind it. Over the period, millions of independent cultures and systems evolved in different parts of the world. Each ethnic community could establish its own unique knowledge systems through trials and errors, which percolated almost in pure form through oral folklore to the generations. Realizing the importance and churning the precious traditional knowledge, a new scientific discipline emerged, which we know today as "Ethnobotany". Vast ethnobotanical knowledge exists in India from ancient time in Vedas and Samhitas. As an organized natural science, Ethnobotany in India is rather young, just about six decades old. It got considerable attention since middle of the 20th century. Padmashri Dr. E.K. Janaki Ammal initiated it in 1954. Dr. S. K. Jain, F.N.A was the first person to sow the seeds of Ethnoboanical studies in Central India and initiate historical and remarkable ethnobotanical journey for the botanists and scientists from various disciplines in India. The footprints of his journey as ethnobotanist is marked as era in Indian subcontinent. The present communication illustrates in detail the development of ethnobotany in India in last 65 years.

Key words: Indian Ethnobotany, Dr. S.K. Jain's Era, Way forward

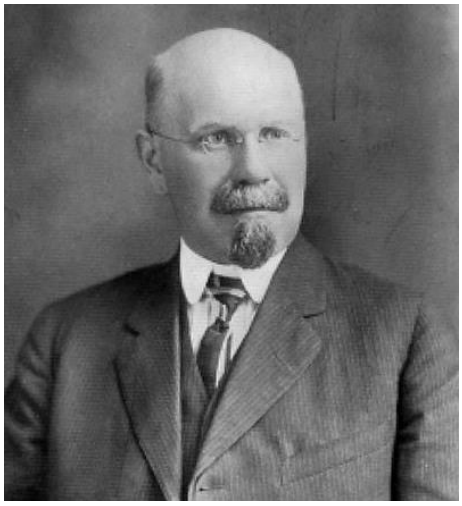
Introduction

Evolution of humanity and intimate relationship of human being with the plants remains interesting subject for scholars to understand and research the whole science behind it. The learnings about the utilitarian aspects of plants were initially just to survive and compete with adversities of nature during the pre-farming paleolithic 'Old stone age'. Gradually, the relationship was more intimate to ensure food security, health security and all kinds of requirements of human being to occupy and dominate major area on the earth. A major shift from food gathering habit to domestication of useful crops and animals during the Neolithic of 'Middle stone age' (from 12000 to 6000 BC) resulted into settlement of independent ethnic groups and witnessed lots of innovation and discover ways to preserve and pass on acquired valuable information further. Over the period, millions of independent cultures and systems evolved in different parts of the world. Each ethnic community could establish its own unique knowledge systems through trials and errors, which percolated almost in pure form through oral folklore to the generations. This gave birth to the traditions and traditional knowledge. The communities started mingling, exchanging, and integrating with their unique knowledge base. The custodians of traditional heritage meticulously classified do's and don'ts. Such relationship of human with nature, natural resources, flora and fauna was observed, studied and also documented by natives, scholars and historians in one or the other form.

The dynamic evolutionary process also witnessed irreversible loss of traditional knowledge due to invasions, wars, natural calamities, dissociation with local environments and bioresources, and shifting or movements of custodians of traditional knowledge. Added to this, second half of the 20th century with the onset of industrialization, witnessed drastic changes in the mindset of people. On one side the forests, which are the homes of tribal people started declining and on the other side the tribal people moved out of the forests towards cities attracted by modern amenities and lifestyle. This phase certainly demand systematic documentation of the traditional heritage and knowledgebase before it was lost forever. While realizing the importance of churning the precious traditional knowledge, a new scientific discipline emerged, which we know today as "Ethnobotany".

Historical perspective

The roots of the science of Ethnobotany have its origins in the early period of human history. However, Ethnobotany as a modern discipline is said to have emerged only during the later part of 19th century. The term 'Ethnobotany' was first coined by Dr. J.W. Harshberger on 4th Dec. 1895, at a lecture in Philadelphia, to describe his field of inquiry, which he defined as the study of "plants used by primitive and aboriginal people."



Dr. J.W. Harshberger

In 1896, Harshberger published the term and suggested "ethnobotany" be a field which elucidates the "cultural position of the tribes who used the plants for food, shelter or clothing" (Harshberger 1896). Ethnobotany has been defined as the study of the past and present interrelations of primitive or aboriginal human societies with the ambient vegetation. Earlier, in 1874, Stephen Powers had used the term *aboriginal botany* to refer to a study of "all the forms of the vegetable world which the aborigines used for medicine, food, textile, fabrics, ornaments, etc." It was in 1916 that Robbins, Harrington and Marreco promulgated the broad definition of the term ethnobotany which went beyond mere identification and cataloguing of plants used by primitive peoples and attributed to this discipline a study and evaluation of the knowledge of all phases of the plant life amongst primitive societies, and of the effects of the vegetal environment upon the life, customs, beliefs and history of the people of such societies. Some authors even use this term to include the entire scope of economic botany, but it is more appropriately employed for the relationship between primitive man and plants.

Indian Scenario

India has all the three elements that contribute to ethnobotanical richness of an area: these are floristic diversity, ethnic diversity and rich culture diversity. The Indian subcontinent represents, without a doubt one of the greatest emporia of ethnobotanical wealth. Much has been done in ethnobotanical research in India and there is lot more scope for it.

ETHNOBOTANY DEFINED

Harshberger proposed that discipline of ethnobotany might be developed with its own definition, scope, objectives and methodologies. According to some authors (Jones, 1941; Schultes 1941, 1960, 1962; Jain, 1967; De 1968) ethnobotany is the total relationship between primitive people and their plant surrounding. Faulks (1958) included the entire economic botany, which includes the modern use of plants. Its scope was much elaborated by Ford (1978). Let us look at the slight changes in emphasis through a review of current definitions-

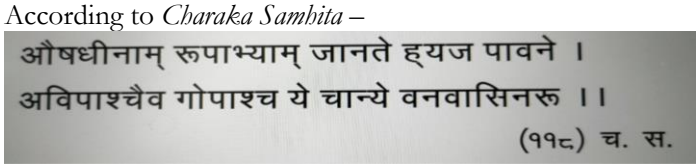
- Jones (1941) defined it as "The study of interrelationship of primitive men and plants".
- Faulks (1958) "The total relationship between men and vegetation".
- Schultes (1962) "The study of relationship which exists between people of primitive society and their plant environment".
- Ford (1978) "Ethnobotany is concerned with a wide range of interest of plants in cultural and ecological context".
- Jain (1986) "The total natural relationship between man and plants".
- Jain (1989) gave a brief description about all relationship between man and plants which can be divided into material and cultural relations under four categories-
  - Relationships useful to both man and plants,
  - Relationships useful to man but harmful to plants,
  - Relationships useful to plants but harmful to man, and
  - Relationship harmful to both man and plants.
- Martin (1995) "Ethnobotany is the part of ethnoecology which concerns plants".
- Cotton (1996) "Ethnobotany is considered to encompass all studies which concern the mutual relationship between plants and traditional peoples".
- Balick and Cox (1996) "In broad terms, ethnobotany is the study of the interrelationship between plants and people. The two major parts of ethnobotany are encapsulated in the word itself; ethno, '*the study of people*', and botany, '*the study of plants*'. However, the field is limited on both sides. On the botanical sides of the field, few ethnobotanical studies are concerned with plants that have no connection to people. On the ethno side, most studies are concerned with the ways indigenous people's use and view plants. And those uses and those views can provide deep insights into the human conditions".
- Alcorn (1996) "Ethnobotany is the study of contextualized plant use".

India is the land of tribal people. The tribal people of India mostly live in forests, hills, plateaus and naturally isolated regions and are differently termed as Adivasi (original settlers), Adim niwasi (oldest ethnological sector of population), Adimjati (primitive caste), Anusuchit Janjati

(scheduled tribe) and several names signifying their ecological or economic or historical or cultural characteristic. Among these the most popular is 'Adivasi', while in India constitution name for them is 'Anusuchit Janjati' (Scheduled tribe) (Jain, 1987).

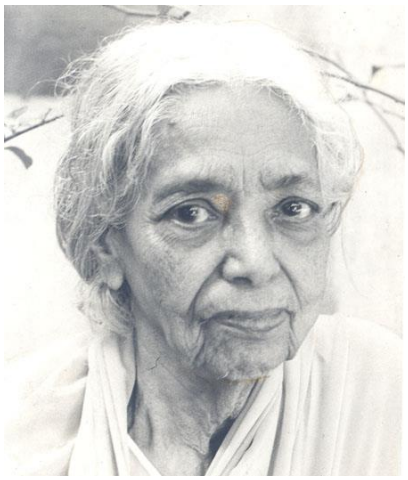
In India there are about 705 tribal communities of 227 ethnic groups as per the classification made by anthropologists on linguistic basis. Their population in India is 10.42 crore constituting 8.6% of the total population (2011) census. They mainly inhabit about 5000 forested villages or lead a nomadic life in the forests. Ethnobotany must have been the first knowledge, which the early man acquired by sheer necessity, intuition, observation and experimentation. Vast ethnobotanical knowledge exists in India from ancient time in Vedas and Samhitas. Works of Charaka, Susruta and Dhanwantari attracted serious attention of people in India even during the early centuries.

According to *Charaka Samhita* –


औषधीनाम् रूपाभ्याम् जानते ह्यज पावने ।
अविपाश्चैव गोपाश्च ये चान्ये वनवासिनरू ।।
(११८) च. स.

Cattle grazers, shepherds and forest dwellers have the deep knowledge of medicinal plants of the forest and identify them by name, morphology and properties. The Ayurveda students should learn the name, property and morphological characters of medicinal plants from these people with deep interaction.

Although the concept and definition of the science of Ethnobotany were revealed by Powers (1874) and Harshberger (1895), the elements of this science appeared in India even before. Garcia da Orta (1563) published a book '*Coloquios dos simples' e drogas medicinas da India*'. It informed about 50 common taxa of medicinal significance and other utilities as gathered around Goa and in Malabar. Acosta (1578) also published a book '*Tractado de las drogas y medicinas de las Indias Orientalis'* on Indian medicinal plants from Malabar. Van Reede, the compiler of '*Hortus Malabricus'* (1678-1693) gave an excellent and accurate introduction of Malabar, its people and their costoms, especially the virtues of the medicinal plants. The science of ethnobotany began taking shape during British regime. They surveyed wild and cultivated plants as a part of their floristic studies. William Roxburgh (1832) noted medicinal uses of herbs during his floristic investigations from south India. Sir George Watt published '*Dictionary of the Economic Products of India'* (1889-1896). In this Dictionary he provided nearly 3000 local names of the plant products and their uses as obtained from various regions of India. His work is not only a monumental one, but also reflects true 'Ethnobotany' and indigenous knowledge of Indian societies. Later, Bodding (1925, 1927, and 1940) published medicines used by Santal tribe (Patil, 2012).


Dr. E.K. Janaki Ammal

As an organized natural science, Ethnobotany in India is rather young, just about six decades old. It got considerable attention since middle of the 20th century. Padmashri Dr. E.K. Janaki Ammal, initiated it as an official programme in the Economic Botany Section of Botanical Survey of India, since its very inception in 1954 and studied subsistence food plants of certain tribes especially of South India (Janaki Ammal, 1956). She lit the lamp of 'Scientific Indian Ethnobotany' by creating an 'Ethnobotanical Section' at the Central Botanical Laboratory, B.S.I. Allahabad. She did express loud thinking and a wish in her publications, which was admirably fulfilled later by Dr. Sudhanshu Kumar Jain.

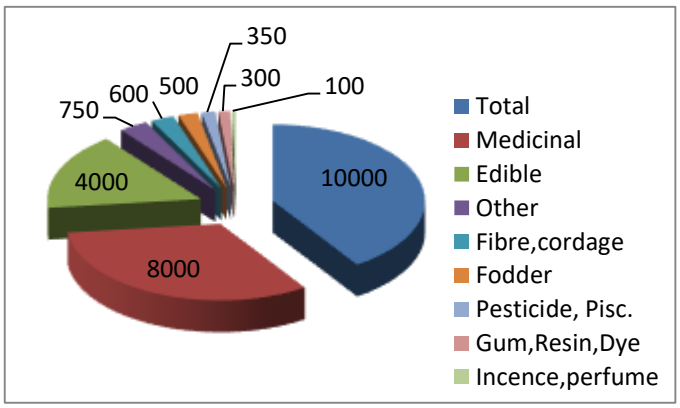

Dr. S.K. Jain

Dr. S.K. Jain, F.N.A. in his various capacities with Botanical Survey of India (Director, 1978 – 1984), National Botanical Research Institute, Lucknow (National Pitamber Fellow, CSIR Emeritus Scientist, UNDP and Earthwatch Project Head, and Fellow of INSA etc.) was the first person to sow the seeds of Ethnobotanical studies in Central India and initiate historical and remarkable ethnobotanical journey for the botanists and scientists from various

disciplines in India. He streamlined this science and trained many students. He did a very painstaking work moving in the deep tribal village of India, studying their medicinal practices and recording their use of medicinal plants against various diseases. Some of his important works are on the tribals of Madhya Pradesh, Bihar and Assam. He has compiled ethnobotanical works in India under the title *Dictionary of Indian Folk medicine and Ethnobotany* (Jain, 1991), *Notable plants of Ethnomedicine of India* (Jain *et al.*, 1991), *'A Handbook of Ethnobotany'* (Jain & Mudgal, 1999) and *Tribal Medicine* (Pal & Jain, 1998). He has edited several books, such as *Glimpses of Indian Ethnobotany* (Jain, 1981) which triggered the study of ethnobotany in India, *Bibliography of Ethnobotany* (Jain *et al.* 1984), *Bibliography of Indian Ethnobotany* (Jain, 2002), *Methods and Approaches in Ethnobotany* (Jain 1989), *Contribution to Ethnobotany* (Jain, 1990) *A Manual of Ethnobotany* (Jain, 1995), *Ethnobiology in Human Welfare* (Jain, 1996) *Dictionary of Ethnoveterinary Plants of India* (Jain 1999), *Bibliography of Indian Ethnobotany* (Jain, 2002) and *Plants affecting human mind* (Jain, 2009). Besides the books, since beginning from 1963 till date he has published more than 300 research papers on different aspects on Ethnobotany and Folklore medicine in India. Dr. S.K. Jain truly deserved to be called as the **"Father of Indian Ethnobotany"**.

Tamilnadu (Vishwanathan *et al.* 2006) and *Ethnobiology* (Sinha, 2001) are some other important books of the recent time for ethnobotanical work in India. In the early 1980's the Department of Environment and Forest, Government of India funded an *All-India Coordinated Research Project on Ethnobiology*. This work triggered the ethnobotanical study in India and work was carried out in over a dozen institutions under the Botanical Survey of India (BSI), Council of Scientific & Industrial Research (CSIR), some universities and other laboratories of India. A large area was covered in a quick survey and significant ethnobotanical data were recorded.

Over 10000 wild plant species used by tribals for meeting their varied requirements have been recorded so far. Out of 8,000 wild plant species used by tribals for medicinal purposes, about 2000 are found to be new claims and worthy of scientific scrutiny. Out of 4000 wild plant species used as edibles by tribals, about 800 are new information and at least 250 of them are worthy of attention to be developed as alternative source of food that the world would need in the future. Similarly, out of over 600 wild plant species used by tribals for making fibre for cordage, 80 are promising for commercial exploitation. Out of 500 plant species used as fodder, 100 are worth recommending for wider use and out of the 325 wild plant species used by tribals as piscicides and pesticides; at least 180 are quite promising to be developed as safe biopesticides. Almost all the plants used as gum, resin, dye, incense and perfumes are worth investigating since there is a revived interest the world over for natural sources of these products (Pushpangadan & Pradeep, 2008).



The Central Council for Research in Ayurveda and Siddha (CCRAS), New Delhi had also launched a country-wide programme of ethno-medico-botanical surveys in the tribal pockets to gather data relating to folk medical lore, diseases and others health problems affecting the population. The Central Council for Research in Unani Medicine, New Delhi has also conducted ethnobotanical research in Unani herbal drugs. These studies have also been undertaken at the National Botanical Research Institute, Lucknow; Regional Research Laboratory, Jammu-Tawi; Botanical Survey of India, Kolkata; Birbal Sahni Institute of Palaeobotany, Lucknow; Bihar Tribal Welfare Research Institute, Ranchi; Central Institute of Medicinal & Aromatic Plants, Lucknow; Tropical Botanical Garden & Research Institute, Palode; International Institute of Ayurveda, Coimbatore; Tribal Research and Training Institute, Gujarat Vidyapeeth, Ahmedabad; National Bureau of Plant Genetic Resources, New Delhi; M.S. Swaminathan Research Foundation, Madras; Indian Institute of Science, Bangalore; Indian Statistical Institute, Kolkata; Departments of Botany, Jiwaji University, Gwalior; H.S. Gour Vishwavidyalaya, Sagar; R.D. Vishwavidyalaya, Jabalpur; Rajasthan University, Jaipur; Gauhati University, Guwahati; Calicut University, Calicut; Garhwal University, Srinagar; J.N.V. University, Jodhpur; Barthiar University, Coimbatore, Gorakhpur University, Gorakhpur, and many other Universities and Colleges in India. However, the loss of ethnobotanical diversity associated with indigenous people is one of the great crises of our time.

The Society of Ethnobotanist (SEB) was established in 1980 and it started publishing its journal exclusively on ethnobotany called *'Ethnobotany'* in 1989. The society also conducts training programme in ethnobotany in well-designed manner to make understand the scope and concept of ethnobotany for young researchers in the field of ethnobotany. So far eight training courses have been organized by the society.

In 1995 – the year of world indigenous people, Dr. S.K. Jain an Emeritus Scientist and former Director of Botanical Survey of India established an ethnobotanical institute named "Institute of Ethnobiology (I.O.E.)" in National Botanical Research Institute, Lucknow which gives the enhancement to the study on ethnobotany in India. Now this institute has been shifted to Jiwaji University Gwalior, Madhya Pradesh and rechristened as "S.K. Jain Institute of Ethnobiology" under the leadership of Prof. Ashok Kumar Jain as the first Honorary Director of this Institute. There are more than 300 doctoral theses (Ph.D.) published from different Universities and Institutions based on ethnobotanical field work in different ethnobotanical aspects of various tribal communities in India.

Ethnobotany is multidisciplinary science mainly studied by botanists, anthropologists, linguists, phytochemists, pharmacologists, pharmacognosits, archaeologists, psychologists, and even paleobotanists. In case of interdisciplinary study of ethnobotany, there are always more than one subject involved, extending beyond ordinary realm of botany and has significance input of another branch of science, like archaeology or medicine.

ETHNOBOTANY JOURNALS IN INDIA

Apart from these many other researchers worked in different regions of India and got their research papers published in various journals. A large number of journals are being published form all over India, such as *Ethnobotany, Bull of Pure & Applied Science, Vegetos, Jour. of Non Timber Forest Products, Nagarjun, Vanyajati, Folklore, Indian Medicinal Journal, Ethnomusicology, Jour. of Plant Sciences, Journal of Applied Biosciences, Indian medicine, Jour. of Scientific Club, Proc of Nat. Acad. Science India, Bull of Regional Research Laboratory, Jammu, Quart. Jour. of Mythol. Soc., Bull. Bot. Surv. India, Bull. Medico-Ethnobot. Research, Indian Forester, Indian Jour. of Bot. Res., Agric. biol. Res., J. Res. Indian Med. Yoga Homoeo., Ad. Pl. Sci., J. Envir. Conserv., Proc. natl. Inst. Sci. India, Khadi Gramodyog, J. Anthropol. Soc. Bombay, Ind. Jour. Forestry, Indian Jour. Orthopaed., Adibasi, Interdiscipl. Sci. Rev., Indian med. J., Jour. Med. Arom. Pl. Sci., J. Scient. Res., Indian J. Appl. pure Biol., Jh. Anthrop. Soc., J. Trop. For., Biome, Geobios, Bengal Nat. Hist. Soc., Acta Bot. Indica, Social Pharmacol., Vaghbhata, Jour. of Swamy Bot. Club, Aryavaidyan, Ancient Sci. Life, Bull. Tribal Res. Instt. Bhopal, Sachitra Ayurved, Appl. Bot. Abst., J. Asiatic Soc., Indian Mus Bull., Jour of Indian Bot. Society, Jour of Econ. & Tax. Bot., Indian J. Tradition. Knowledge, Jour. of Natural Remedies, Nat. Jour. of Life Sciences, Natural Product Radiance, Arunachal Forest News, Science & Culture, Biovigyanam, Jour. Agric. Sci., Amruth, Int. Jour. Drug Disc. & Herb. Res., Tribe, Man in India, Bull of Narcotics, Food and Nutrition, Bija, Plant Genetic Resource Newsletter, Forest, Trees and People News Letter, Honey Bee, Indigenous Plant Use News Letter,. Int. Jour. Pharmacy & Life Science*, etc.

Ethnobotany has its roots in botany, the study of plants. Botany, in turn, originated in part from an interest in finding plants to help fight illness. In fact, medicine and botany have always had close ties. Many of today's drugs have been derived from plant sources. Pharmacognosy is the study of medicinal and toxic products from natural plant sources, so we can say that the Ethnobotanical information on the use of plants in various diseases and ailments provide valuable clues to the pharmacologists, chemists and ayurvedic practitioners in the search for new drug resources of herbal origin.

More and more new lines of interdisciplinary researches are emerging under specialized titles, like Ethnopharmacology, Ethnomedicine, Ethnogynaecology, Ethnopaediatrics, Ethno-agricultue, Ethnobiology, Ethnotoxicology, Ethnonarcotics, Ethnoorthopedics, Ethno-ophthalmology, Ethnohoriti-culture, Ethnolimguistics, Ethnocosmetics, Archaeoethno-botany, Ethnomusicology etc. Ethnopharmacology is interdisciplinary between two subjects, ethnology and pharmacology, Archaeoethnobotany involves three subject, ethnology, archaeology and botany. This concept has been lucidly illustrated in the most fascinating book on Ethnobotany "*Evolution of the Discipline* (Schultes and Von Reis 1995), published on the 100th anniversary of the science of ethnobotany. It presents a broad fully inter-disciplinary approach to the study of human evolution and use of plant materials in primitive and unlettered societies. Sub disciplines of Ethnobotany include ethnobotanical works on subgroups of plant kingdoms, like fungi, bryophytes, pteridophytes, lichens, etc., and have been named as Ethnoalgology, Ethnomycology, Ethnobryology, Ethnopteridology, Ethno-lichenology, etc. Studies on special aspects of botany, like system of classification, medicinal uses, palaeobotany, ecology, etymology, etc. are also sub disciplines and are termed as Ethnotaxonomy, Ethnomedicobotany, Palaeo-ethnobotany, Ethnoecology, Ethnoetymology, etc. (Jain 1889). In some sub disciplines like Ethnobryology, use of bryophytes among the ethnic groups will come under this subject. Ethnolichenology is the knowledge of lichens among different ethnic groups (Jain and Mudgal, 1999).

Scope of Ethnobotany

Ethnobotany is virtually a new field of research, a field which, if investigated thoroughly and systematically, will yield result of great value to the ethnologists and incidentally also to the botanists. Ethnobotany is a science, consequently scientific methods of study and investigation must be adopted and adhered to as strictly as in any of the older divisions of scientific work. It is a comparatively easy matter for one to collect plants.

Ethnobotany is a multidisciplinary science and its scope is not confined to one area but it covers a broad range of study areas, which are interconnected to each other in one sense or the other. So, there is a great opportunity to explore the ethnobotanical approach towards the modern civilization and giving them a firm task, which should include:

- Conservation of plant species-including varieties of crops and other forms of biological diversity.

- Botanical inventories and assessment of the conservation status of the species.
- Sustainability in supplies of wild plant resources.
- Enhanced food security, nutrition and healthcare.
- Preservation, recovery and diffusion of local botanical knowledge and wisdom.
- Reinforcement of ethnic and national identity.
- Identification and development of new economic products from plants, for instance food, crafts, herbal formulations, horticultural plants, etc.

Ethnobotany is an interdisciplinary science which includes aspects of both the sciences and humanities. Ethnobotany can therefore serve as a gateway to many disciplines, such as Botany, Anthropology, Sociology, Ecology, Medicine, Chemistry, Agriculture, Horticulture, Forestry, Agroforestry, Archeology, Systematics, Religious Studies, Linguistics, Nutrition, Conservation, Economics, and Pharmacology, and open a wide field yet to enrich the human knowledge (Balick, 1994). For example, Anthropology is used for identification of ethnic race or community, its origin, history and distribution in other geographical areas. Ethnography is used for Linguistics (Science of language) for identifying the language in jotting down the names of plants, with correct phonetics and etymology (Shah, 2008).

Ethnobotany is not only a list of plants and their use in tribal, rural and other environments inhabited by aboriginal and other underdeveloped people, but due to its interdisciplinary nature and socio-economic impacts, the linkage of Ethnobotany has proliferated and relevance has been established with problem of food, life support species, rural health, drug use, social settlements, cottage industries, economic upliftment, conservation of ecosystem and energy, etc.

The scope of ethnobotany in drug research needs no elaboration. Folk medicine followed by critical scientific evaluation has produced new drugs to fight diseases. Some folk medicines are now used in mainstream medicare programme. Discovery of medicinal properties of certain plants, like Artimisnine drug is obtained from *Artimisia annua* and has antimalarial properties. Similarly, Reserpine is obtained from *Rauwolfia serpentina* (hypotensive, tranquilizer), Caffeine from *Camellia sinensis* (male contraceptive), Quinine from *Cinchona officinalis* (anti-neoplastic), Vincristine from *Catharanthus roseus* (anti-neoplastic). Recently 'Jeevaniya' from *Trichopus zeylanicus* is discovered in Thiruvananthpuram district of Kerala, by the help of 'Kani' tribals of Agasthyar hills, which has been reported to possess rejuvenative, immuno enhancing, anti-stress and anti-fatigue properties.

Since ancient times new food plants have been discovered and the existing species of food plant have been improved by the process of selection. Arora (1981) mentioned that Chinese helped in the development of courtyard cultigens of *Amorphophallus harmandii*, *A. rivieri* and to some extent also *Eleocharis tuberosa* and *Stachys sieboldi* for root and tuber plant. They also domesticated several species of bamboo, e.g. *Phyllostachys aurea*, *P. aureosulcata*, *P. bambusioides*, etc. *Malva verticillata* var. *verticillata* – a weed is also domesticated for leafy vegetable. People of far-east, near-east, Central Asian Republic of USSR and of Mediterranean region have domesticated several species of pome, stone, soft and nut which include *Potentilla reptans* var. *sericophylla*, *Crataegus hupehensis*, *Prunus pseudocerasus*, etc. It is reported that about 50 species are new for food value in India following ethnobotanical approaches, *e.g. Abelmoschus moschatus* (roots are cooked and used as vegetable by inhabitants of Maharashtra), *Arisaema tortuosum* (the whole plant is cooked by the aboriginals of Jalpaiguri district, West Bengal and its tubers and seeds are cooked and used as vegetable in Bihar, Madhya Pradesh), etc.

The other major aspects of ethnobotanical work are the finding of new uses or new economic plants which include less known uses of plants like their use as fodder, fiber, fuel, oil, gum, and other materials. Impact of this study (ethnobotany) in conservation of natural resources is direct. On one hand it relates to the beliefs, taboos, avoidance and other constructive approaches of the primitive people and on the other hand cultivation practices of some primitive people, adversely affecting the environment are highlighted. The aboriginal or tribal people have preserved the forest through mythological associations as sacred groves.

The new areas of observation in the field of ethnobotany are selection of species to be consumed, time of collection or exploitation, the conservation through taboos, manipulation of species and habitat protection through faith, processing of wild foods for making them free from toxic contents, and their preservation, mode of cooking for saving energy and names given to plants.

Today, ethnobotany has become an important and crucial area of research and developments in resource management, conservation of biodiversity at genetic, species and ecosystem levels, and socio- economic upliftment of the region. Many plants (e.g. maize, cocoa and rubber) used in industrialized countries today were originally identified and developed through indigenous knowledge (IK). Traditional food plants such as roots and tubers (cassiava, potatoes, yams, taro, sweet potato and plantains) nourish over 1000 million people in the developing countries, providing a significance portion of essential calories to them. In this connection mention may be made of a rare medicinal plant, *Tricopus zeylanicus* ssp. *travancoricus*, used by the Kani tribe of Kerala, India as a

health food to maintain vitality and increase resistance to disease. The tonic effect of the plant has been shown to be comparable to that of Korean ginseng (*Panax ginseng*). The winged bean (*Psophocarpus tetragonolobus*), a crop native to South-East Asia, has great potential for feeding many in the Third Word. The popular name for the winged bean is the "supermarket in the stalk", since one can eat almost every part of it. The leaf, rich in Vitamin A, tastes like spinach; the shoot, like asparagus; the flowers, like mushroom. The seed virtually duplicates soybeans in nutritional value, while the tuber contains two to four times protein of a potato. Currently about 2000 varieties of the winged bean are known, which is a potential money maker. One hectare of winged bean produces nourishment equal to five or six hectare of most other crops. Some of the so called "New Crops" whose commercial production has been developed in the 20th century, such as African oil palm, para rubber, robusta coffee, tepary bean, guayule rubber and jojoba were previously known and used locally by indigenous people. During the last few decades, successions of so called "Wonder Drugs" (e.g. reserpine, quinine, ephedrine, cocaine, emetin, khellin, colchicines, digoxin, D-tubocurarine, artimisinine and gugulipid) have been discovered from plants with rich ethnobotanical role in tribal societies. The Indian tobacco (*Lobelia inflata*) used as a tobacco substitute by the Amerindians, contains lobeline, now commercially used as a smoking deterrent. The May-apple (*Podophyllum peltatum*) has a toxic resin, podophyllotoxin formerly used by Amerindians to remove warts; its cytotoxin action has led to its modern use to treating uterine warts which formerly required surgery. The cardiotonic strophanthine comes from seeds of a species of *Strophanthus* that is used by African tribes as the source of its arrow poison. The tranquilizers, rescinnamine and reserpine, have been obtained from the roots of *Rauwolfia serpentina,* used in India for more than a thousand years in folk medicine for snake bite, insanity, epilepsy and high blood pressure. In the 1930s Indian workers started an investigation of the plant which led to the isolation of the alkaloid "reserpine" in 1952 and was shown to possess all the main pharmacological properties of the root. This discovery initiated an intensive screening for this therapeutically valuable alkaloid in the genus *Rauwolfia* and subsequently, also in other closely related genera of the Apocynaceae. On the basis of this screening, *R. vomitoria* of Africa and *R. tetraplylla* of America are now used for the commercial extraction of reserpine. The natives of Madagascar valued the rosy-periwinkle (*Catharanthus roseus*) as an oral hypoglycemic (Reduction of the sugar content of the blood) agent; it yielded two powerful drugs, vinblastine and vincristine, effective against Hodgkin's disease and childhood leukaemia. Hypertensive agents from *Veratrum album* used by natives in America, khellin from *Visnaga daucoides* of the ancients, and many psychoactive agents developed from the hallucinogenic plants of the New World Indians.

In a recent case, Ethiopian villagers living down river from a community washing site were surprisingly found to be virtually free of bilharzia or schistosomiasis, a parasitic disease which affects more than 200 million Africans. The reason was that the women upstream washed their cloths with dried and powdered berries of the endod (soapberry) plant (*Phytolacca dodecandra*) which killed the disease-carrying snails. This observation led to the discovery of a molluscicide (bayluscide) to destroy the snails that transmit schistosomiasis. The documentation of the available folk knowledge of endod is, therefore, crucial to health care, industries and agriculture in both developed and developing countries.

The extinct *Silphion* plant embossed on the coins minted in Cyrenaika (Libya), has been mentioned in classical literature by Pliny, Hippocrates, Dioscorides, Herodotus, Theophrastus and others. The perennial roots and annual stems were eaten in the fresh state and were regarded as a perfume, flavouring agent and spice. The juice was used in medicine against a wide range of symptoms and diseases, especially gynaecological ailments. As demand in the Greek and Roman worlds was great, and the supply limited, *Silphion* gained high prices on the international markets. There was a gradual vanishing of the *Silphion* due to unsustainable harvesting practices. Several names like *Thapsia silphium, T. garganica, Ferula tingitana, F. marmarica* and *Prangos ferulacea* have been suggested for *Silphion,* but it is said to have close affinities to *Ferula tingitana,* a species which is rare in Cyrenaika today. This is example of an ancient medicinal plant which became extinct almost 2000 years ago.

Of the 120 active compounds currently isolated from higher plants and used in medicine, 74 per cent show a positive correlation between their modern therapeutic use and the traditional use of the plant from which they were derived (Maheshari, 1996). Some of the plant derived modern medicines are given in the Table 1.

The tribes Gond, Bhil, Santhal, Oraon, Mina, Munda, Khond, Kachari, Ho, Khasi, Kawar, Saora, Naga, Kol, Mawasi, etc. of India are predominantly dependent on plough cultivation. The tribal people who have traditionally lived in tropical forests are the key to understanding, utilizing and conserving the plant diversity. The traditional storage of ethnobotanical knowledge in memory and practice has a long history. Several Asian countries have begun to encourage traditional medicines as an integral component of health care systems. The forest resources (e.g. rattan, bamboo, oilseeds, lac, latex, honey, gums and resins, medicinal plants, fruits and nuts, mangroves and mushrooms) are rich and unique; they are not as well documented as the timber resources.

Table 1

Drug	Medicinal Use	Plant name
Aspirin	Analgesic, Anti-inflamatory	*Filipendula ulmaria*
Atropine	Pupil dilator	*Atropa belladonna*
Benjoin	Oral disinfectant	*Styrax tonkinensis*
Caffeine	Stimulant	*Camellia sinensis*
Camphor	Rheumatic pain	*Cinnamomum camphora*
Cascora	Purgative	*Frangula purshiana*
Cocaine	Ophthalmic anaesthetic	*Erythroxylum coca*
Codeine	Analgesic antitussive	*Papaver somnifera*
Colchicine	Gout	*Colchicum autumnale*
Deserpidine	Anti-hypertensive	*Rauvoulfia tetraphylla*
Dicoumarol	Anti-thrombotic	*Melilotus officinalis*
Digitoxin	Cardiotonic	*Digitalis purpurea*
Ephedrine	Broncholidator	*Ephedra sinica*
Pseudoephedrine	Rhinitis	*Ephedra sinica*
Eugenol	Toothache	*Syzygium aromaticum*
Hyoscymine	Anti-cholinergic	*Hyoscymus niger*
Ipratropium	Broncholidator	*Hyoscymus niger*
Morphine	Analgesic	*Papaver somniferum*
Papaverine	Anti-spasmodic	*Papaver somniferum*
Podophyllotoxin	Condyloma accuminatum	*Podophyllum peltatum*
Psoralin	Vitiligo	*Cullen corylifolium*
Quinine	Malaria	*Cinchona pubescens*
Reserpine	Anti-hypertensive	*Rauvolfia serpentina*
Sennosides	Laxative	*Senna alexandriana*
Artimisinine	Anti-malarial	*Artemisia annua*
L'Dopa	Anti-parkinsonian	*Mucuna pruriens*
Vinblastine	Hodgkins disease	*Catharanthus roseus*
Vincristine	Paediatric leukaemia	*Catharanthus roseus*
Picroliv	Chronic hepetitis	*Picrorhiza kurroa*
Gugulipid	Hyperlipidemic	*Commiphora wightii*
Forskolin	Anti-glaucoma	*Coleus forskohlii*
Taxol	Ovarian and breast cancer	*Taxus baccata*
Jeevaniya	Anti-fatigue	*Trichopus zeylanicus*

With the opening of new vistas of ethnobotanical studies, the scope of ethnobotany has now greatly enlarged; both in terms of its theoretical contributions to an understanding of plant human relationships, as well as practical applications of the biological knowledge of the tribal people in medicine, agriculture, health and industry. Recent developments in ethnobotany in India, China, Nepal, Pakistan, Philippines, Malaysia, Sri Lanka, Thailand, Indonesia, Vietnam and other countries have been strongly oriented towards the promotion of traditional herbal medicine, sustainable use of plant resources, rural development and biodiversity conservation, with applied approaches in the field. There are four major interrelated fields of study in ethnobotany: (i) Basic documentation of traditional botanical knowledge; (ii) Quantitative evaluation of the use and management of botanical resources; (iii) Experimental assessment of the benefits derived from plants, both for subsistence and for commercialization; and (iv) Applying traditional ecological knowledge to biodiversity conservation and community development. These studies have been referred to the basic, quantitative, experimental and applied ethnobotany respectively.

The tribal people and ethnic races throughout the world have developed their own cultures, customs, cults, religious rites, taboos, totems, legends and myths, folk tales and songs, witchcraft, foods, medical practices etc. Numerous wild and cultivated plants play a very important and vital role among these cultures and this interrelationship has evolved over generations of experience and practice. These studies have therefore also been used in tracing human and plant migrations; origin, dispersal and domestication of cultivated plants, like maize, tepary beans, squash, pumpkin and cashew, watermelon, bottle gourd, jack bean, sword bean, common bean, foxtail millet, marigold, sunflower, amaranth, chenopod, sorghum, etc.; in linguistic analyses; in archaeological identifications; agricultural techniques and agronomy, horticulture, pharmacopoeia, etc. Practically all cultivated plants were originally domesticated by primitive people. The tribal belt is more often the center of diversity and origin of our crop plants (Rice, bean, etc.). The ancestors of many of our crop plant and landraces are interwoven with tribal cultures.

Harshberger (1896) for the first time outlined the purpose of ethnobotanic gardens. The plants of ethnobotanical importance like maize, sunflower, tomato, potato, tobacco, rice, pumpkin, yam, taro, arrowroot, manioc, sweet potato, quinoa, etc., associated with tribal people were grown over the ages, as part of the life support system for survival, substance and livelihood. In modern times, these gardens should play a major role in the conservation of rare and endangered ethnobotanicals, by providing insurance against extinction in the world.

The ethnobotanical literature has been growing rapidly over the last hundred years. Many important documents exist as ethnographies, archaeological accounts, travelogues, gazetteers, herbals, materia medica, unpublished papers, manuscripts and theses, and reports of the tribal development projects, etc. intended for local distribution. There are reportedly 100,000 medical manuscripts of traditional medicine lying in oriental libraries and private collections. An old record about herbal medicines written on palm leaves about 1710 A.D. was discovered in South Bastar, M.P., India. This document records 93 types of herbal medicines used in the district. The traditional medicine databases (TRAMED, NAPRALERT, PHARMEL, AYURBASE, NORISTAN and INMEDPLAN) have been making the information on medicinal plants available to the interested parties, including traditional healers.

JOURNALS, BULLETINS, MAGAZINES AND NEWSLETTERS ON ETHNOBOTANY

Economic Botany, Jour. of Ethnopharmacology, Ethnobotany Leaflets, Indigenous Knowledge & Dev. Monitor, Int. Jour. Pharmacognosy, Jour. Trop. Med. Plants, Journal of Ethnobiology, Jour of Ethnobiology & Ethnomedicine, Lloydia, National Geographic, Eastern Pharmacist., Science, Quart J. Crude Drug Res., The Latin American and Caribbean Bulletin of Medicinal and Aromatic Plants, Journal of Ethnobiology, Journal of Ethnobotany Research & Applications, African Diversity, Australian Tree Resources News, Ethnomedizine, Studies in Third World Soc., Bulletin de Liason de la Societe d' Ethnozoologie et d' Ethnobotanique, Afr. Jour. Traditional Medicine, Complementary & Alternative Medicine, Int. jour Sustainable Dev. & World Ecology, Anthropos, Pharmaceutical Biology, Fitoterapia, Curare, Ethnographia, Ethnos, L' Ethnographie, Ethnographica et Folkloristica Carpathica, Emilio Goldi, Asian Folklore Studies, American Antiquity, American Ethnologist, The Journal of the Polinesian Soc., Ethnologiska, Jour. of American Folklore, Human Ecolog, The Cerealist, Jour. d'Agriculture Traditionnelle et de Botanique Applique, Studier, Jour. Pacific History, Acta Ethnographica, Primitive Man, Ceres, Jour. of Plant Foods, Social Pharmacology, Diversity, Current Anthropology, Planta Medica, Jour. Psychoactive Drugs, Ethnology, Ethnohistory, Anthropos, Ethnographia, Asian folklore studies, Journal d'Agriculture Traditionnelle et de Botanique Appliquee, American Antiquity, American Ethnologist, Studier, The Journal of Pacific History, Acta Ethnographica, L'Ethnographie, Bulletin on Narcotics, Studies in Third World Societies, Botanical Museum Leaflets (Harvard University), Advances in Economic Botany, Heritage Seed Program, Ethnoecologica, Archaeology, Medical Anthropology, Human Ecology, Seedling, Journal of Psychoactive Drugs, Chemical and Pharmaceutical Bulletin of Tokyo, African Diversity, Plant Genetic Resources Newsletter, Australian Tree Resources News, Forest, Trees and People Newsletter, ILEIA Newsletter, etc. which cater to the needs of researchers, scientists and others engaged in various aspects of ethnobotany (Maheshwari,1996).

Some societies like Ethnographic and Folk Culture Society, Indian Folklore Society, The American Ethnological Society, Society of Ethnobotanists, The Polynesian Society, Societe d'Ethnozoologie et d'Ehnobotanique, National Society of Ethnopharmacology, India; French Society of Ethnopharmacology, Society of Ethnobiology, Society of Ethnomusicology, International Society of Ethnobiology, The KUSA Society, Indian Association for the Study of the Traditional Asian Medicine, etc., have also been established to promote the science of ethnobotany and its related fields (Maheshwari,1983).

In the United States and Canada more research is being carried out each year. Many more university courses in ethnobotany are now being offered and the number of doctoral dissertations based on ethnobotanical field work has proliferated. The discipline is alive and prospering in many other countries around the globe like Mexico, Colombia, Brazil, Germany, Spain, Italy, the United Kingdom, France, China, Kenya, Malaysia, Thailand, Nepal, and Bangladesh, etc. The knowledge and culture of indigenous peoples are disappearing even faster than the plants themselves. The forest plays a vital role in the life and economy of tribal and rural peoples. The rapid loss of forest cover poses a serious environmental threat. It is caused by expansion of croplands, shifting cultivation, commercial logging, firewood gathering and forest fires.

BOOKS ON INDIAN ETHNOBOTANY

*Dictionary of Economic Products of India (*Watt 1896*)* and *Wealth of India* published by CSIR are the important source of ethnobotanical data. *Cross-Cultural Ethnobotany of North-East India* (Saklani & Jain 1994), *Applied Ethnobotany: A case study on the Kharias of Central India* (Verghese 1996), *Ethnobotanical Wisdom of Gaddi tribe in Western Himalaya* (Singh & Kumar 2000), *Ethnobotanical Lore of the Paharias* (Verghese and Hembrom 2000), *Ethnobotany and Medicinal Plants of India* (Maheshwari 2000), *A Lexicon of Medicinal Plants* (Bakshi et al. 2001), *Ethnobiology Role of Indigenous and Ethnic Societies in Biodiversity Conservation, Human Health Protection and Sustainable Development in India* (Sinha et al. 2001), *Biodiversity Endangered : India's Threatened Wildlife and Medicinal Plants* (Chaudhuri & Sarkar 2002), *Directory of Indian Economic Plants* (Agarwal et al. 2003), *A Hand Book on the Plant Sources of Indigenous Drugs* (Ansary, 2005), *A Dictionary of Medicinal Plants in India* (Sandhu & Singh 2005), *Ethnic Aphrodisiac Plants* (Sood et al. 2005), *Ethnic Plants of India : Used in Cancer Cure* (Sood, et al. 2005), *Ethnobotany of Rewalsar Himalaya.* (Sood & Thakur, 2005), *Ethnobotany of Cold Desert Tribes of Lahoul & Spiti. (*Sood et al.), *Ethnic Indian Plants in Cure of Lung Ailments* (Sood et al.2007), *Ethnobotany of the Kanis: Kalakkad-Mundanthurai Tiger Reserve in Tirunelveli District, Tamil Nadu, India* (Viswanathan et al. 2006), *Ethnobotany and Medicinal Plants of India & Nepal* (Singh, 2003), *Ethnobotany of Rajasthan* (Singh…), *Indian Folk Medicines and Other Plant-Based Products* (Singh 2007), *Ethnobotany and Medicinal Plants of Indian Sub-Continent* (Maheshwari (2000), *Indian Folk Medicine (*Trivedi 2007), *Folk Medicine of Himalaya* (Gulia 2007), *Ethnomedicinal Plants of India (*Trivedi 2007), *A Handbook of Tibetan Medicinal Plants* (Dekhang 2008), *Ethnobotanical Studies on Trees, Shrubs and Climbers of Himalaya* (Sood 2009), *Biodiversity and Conservation of Medicinal Plants* (Tyagi 2009), *Ethnic Tribes and Medicinal Plants (*Trivedi 2010), *Indigenous Ethnomedicinal Plants (*Trivedi,2009), Indian Medicinal plants (Trivedi, 2009), *Ethnobotany of Buldhana District, Maharashtra'* (Patil et al. 2011), *Ethnobotany of Primitive Tribes in Rajasthan* (Joshi, 1995). *Ethnobotany of Nasik District, Maharashtra*' Patil & Patil, 2006), *Ethnobotany of Jalgaon District, Maharashtra* (Pawar & Patil, 2008), *Ethnobotany of Bhil Tribe* (Singh and Jadhav, 2011), *Ethnobotanical studies of Udaypur district* (Khatri**,** 2005), *Ethnobotany of the Tharus of Kheri district of Uttar Pradesh* (Maheshari at al. 1987), *Ethnobotany of Tribal of Mirzapur District of Uttar Pradesh* (Maheshwari et al. 1981), *Folk medicine of Himalaya* (Gulia, 2007), *A Handbook of Tibbatan medicinal Plants* (Dekhang, 2008), *Ethnobiology of India* (Pushpangadan, 1994), *Ethnobotanical Studies on Trees, Shrubs and Climbers,* (Sood et al 2009), *Ethnobotany of Kanis: Kalakkad-Mundanthurai Tiger Reserve in Tirunelveli Dist.*

MANUALS AND IMPORTANT BOOKS ON ETHNOBOTANY

A series of manuals designed specifically for the use of ethnobotanists and plant conservationists in developing countries are *Techniques and Methods of Ethnobotany* (Given and Harris, 1994), *Ethnobotany: a methods manual* (Gary J. Martin 1995), *Plant Invaders: the threat to natural ecosystems* (Cronk and Fuller, 1995), *People and Wild Plant Use* (A.B. Cunningham 1996), *Botanical Surveys for Conservation and Land Management* (Stern and Ashton 1995), and *Botanical Databases for Conservation and Development* provide basic concepts, skills and methods for collection and documentation of quality data in the field. Other major books on ethnobotany from different countries of the world are *Plants, People & Culture: The Science of Ethnobotany.* (M.J. Balick), *Native American Ethnobotany* (Denial E. Moerman), *Ethnobotany: A Reader* (Paul E. Minnis), *Chumas Ethnobotany: Plant Knowledge among the Chumas People of South California,* (Jan Timbrook), *Ethnobotany: The Evolution of a Discipline* (R.E. Schultes & S.V. Reis), *Ethnobotany (The Green World) (*Kim J. Young), *Cultural Uses of Plants: A Guide to learning about Ethnobotany,* (Gabriell D. Paye), *Applied Ethnobotany: People, Wild Plant Uses & Conservation* (Anthony Cunninghum), *CRC Ethnobotany Desk Reference* (Tim Johnson), *Mayo Ethnobotany: Land History & Traditional Knowledge in Northeast Mexico* (David Yetman), *Medicinal plants in Folk Tradition: Ethnobotany of Britain & Ireland* (David E. Allen), *The healing Forests: Medicinal & Toxic Plants of Northwest Amazonia* (R.E. Schultes), *Ethnobotany of the Menomini Indians,* (Huron H. Smith), *Ethnobotany of the Meskwaki Indians* (Huron H. Smith), *Plants and people of the Golden Triangle: Ethnobotany of hill Tribes of Northern Thailand* (Edward F. Anderson), *Huastec Mayan Ethnobotany* (Janis E. Alcorn), *Ethnobotany of Nepal* (K.R. Rajbhandari), *Ethnobotany of California Indians* (George Robert Staw Mead), *People of the Desert and Sea: Ethnobotany of the Seri Indians* **(**Mary beck Moser), *Ethnobotany of Western Washington: The Knowledge and uses of Indigenous Plants by Native Americans* (Erna Gunther), *Ethnobotany: Principles and Applications* **(**C.M. Cotton), *True hallucinogens* (Trance Mckenna), *Plants of the Gods: Their sacred healings and hallucinogenic Powers,* **(**R.E. Schultes), *Sacred Vine of Spirits: Ayahuasca* (Ralph Matzner), *Medicinal & Edible Plants, Ethnobotany and Scientific Studies Plant Field Guide* (Hall C. Raymond & Carry C. Raymond), *Footprints of the Forests Kayapor Ethnobotany* (William Balee), *Tales of a Shamans Apprentice: An Ethnobotanists Search for New medicines in the rainforests* (Mark J. Plotkins), *Amazonian Ethnobotanical Dictionary* (J.A. Duke & R. Vasquez), *Native American Medicinal Plants: An Ethnobotanical Dictionary* (Deniel E. Moermar), *Where the Gods Reign: The Plants and Peoples of the Colombian Amazon,* (R.E. Schultes), *Plant Resins: Chemistry, Evolution, Ecology and Ethnobotany* (Jean H. Langenheim), *Nafanua: Saving the Samoan Rain Forest* (Paul Alan Cox), *Florida Ethnobotany* (Daniel E. Austin), *Ethnobotany in the New Europe* **(**M.P. de Santayara et. al.), *An Introduction to Ethnobotany* **(**P.J. Faulks), *The Nature and Status of Ethnobotany* (R.I.Ford), and *People of the Desert and Sea: Ethnobotany of the Seri Indians* **(**Mary B. Moser & Richard S. Felger) etc.

Over the ages, indigenous people have developed innumerable arts, crafts and technologies. Their cultures, economies and identities are inextricably tied to their traditional land and forest resources. Forests have sustained the culture, spiritual and economic needs of many of the indigenous people. Deforestation, semi-modernization, transmigrations and colonization have threatened the survival of traditional cultures. Television is replacing oral traditions and story- telling; formal education is taking the place of informal learning.

The State of the Peoples Report (1993) published by Cultural Survival, Inc. Cambridge, Mass., U.S.A. presents innovative solutions to the challenges confronting endangered societies. It makes a compelling case that defending endangered people is an essential step toward a peaceful and environmentally sound globe. Many national languages are becoming acculturated and extinct and, therefore, folk taxonomy must be preserved and properly documented. The recent declarations, especially the "Declaration of Belem", the "Kunming Action Plan" and the "Manila Declaration" call for the compensation to indigenous people for their knowledge and their natural resources. The growing markets in forest foods, medicines, cosmetics, lotions, balms and other natural products signal increased research activities with indigenous knowledge sysyem (IKS). Many UN agencies and other organizations realize the significance of indigenous knowledge in science, agriculture and drug development. The Convention on Biological Diversity (1992) signed by 167 states and the European community is a good start in this direction. It accepts the idea that the first beneficiaries of the conservation and sustainable use of wild plant species should be the indigenous people whose traditional knowledge and respect for those resources has preserved them for centuries. In recent years concern has grown worldwide that the natural genetic variability and traditional uses of plants be safeguarded with an eye to potential future use.

The flagship programmes like the Biological Diversity and Genetic Resources Programme of the commonwealth Science Council; the People and Plants initiative Programme of the WWF, UNESCO and the Royal Botanic Gardens, Kew; the Indigenous Food Plants Programmes in Kenya; the International Cooperative Biodiversity Groups Programme of the NIH, NSF and USAID; the Biodiversity Support Program of the USAID, WWF the Nature Conservancy and World Resources Institute; the "Seeds of Survival" Programme of USC Canada; and others have provided the stimulus to achieve sustainable economic growth, and maintain and enhance the natural resource base. The UNDP's Workshop on "Ethnobotanical Exchange between Asia and Amazonia" held at Belem, Brazil in 1991 recommends a three-pronged strategy to strengthen ethnobotanical research throughout the world:

(i) to support ethnobotanical field research training programs, (ii) to strengthen information networks linking field ethnobotanists, and (iii) to apply ethnobotanical knowledge to achieve local and regional socio-economic and environmental gains. These strategies could significantly improve the quality and applications of ethnobotanical research in critical areas of biological and cultural diversity found in Asia. With the beginning of the International Decade of the World's Indigenous People (1995-2004), a new partnership has been created among indigenous organizations, Governments, the United Nations and ethnobiologists. This will help address their needs, promote an understanding of their cultures and incorporate indigenous communities into the decision-making process. In the relatively new scientific field of ethnobotany, plant scientists work with tribes, peasants, local herbal doctors and in tribal markets to study how local plants are used by the people. While they have been concerned mainly with cataloguing the plants used by indigenous people around the world, contemporary ethnobotanists are increasingly collaborating with chemists to analyze the compounds in medicinal plants; with agriculturists and foresters to introduce new crops; and with anthropologists to gather more information on traditional cultures. The new synthesis in ethnobotany has generated a vast array of indigenous knowledge that is very much relevant to the conservation of biodiversity and the sustainable use of plant resources.

Way Forward

With the solid foundation of documented traditional ethnobotanical knowledge, this is the time to analyze the existing ethnobotanical inventories, understand the ethnic science behind the traditional heritage and discover ways to help the indigenous society, their bioresources and the humanity at large. Ethnobotany per se is a vast subject and offers great opportunities in the product development in many areas. Understanding of ethnic ways of environment care, ways of conservation of the nature and natural resources, ways to purify and conserve water, reasons to protect sacred groves and shola, scientific basis of inclusion of plants in rituals, folk songs, folk dances etc., ethnic architecture, designs and arts, science behind traditional cultivations and crop management system, ethnic foods and drinks, ethnomedicines and uniqueness in the formulations, their association with the forests and livelihood through non-timber forest produce, local timbers, furniture, ethnic Crafts, ethnic Fibers, dyes, indigenous fodder and plants used in ethnoveterinary, their folk taxonomy and indigenous produce in the local markets etc. will help to design specific products in the relevant area and establish small or/and large scale industries. This will certainly help to discover ways and protect the intellectual property rights, sharing benefits with the communities and frame appropriate policies to help economy of the local communities.

We need visionary to enrich our ethnobotanical R & D base and product-oriented research. The projects designed for the Ph.D. scholars must help the bioresources and ethnic community. In the beginning of research project, the scholar may be given a target to come up with at least one or two unique products for the community he/she is going to work with. The ethnobotanist shoulders huge responsibility to work closely with the community who need handholding at various stages. At the same time, he has an advantage to make the community aware of their unique bioresources and associated knowledge, prioritize their unique knowledge and technology, help generating intellectual property rights for the ethnic community and go for value addition through collaboration with related organization and manufacturers/industry to take it forward. This will also help finding ways to reduce pressure on their bioresources to sustain and promote commercial cultivation of such useful bioresources.

This is the high time we look for a National Institute of Ethnobotany in India. This will cater to the discipline Ethnobotany, which is well in line with the national and international policies. This Institution will give a boost to the One District One Product program of Government of India and our vision of "One Village - One ethnobotanical Product" program. Apart from the abovementioned areas, the proposed Institute need to focus on cross-cultural studies, creation of Ethnobotanical Digital Libraries, Ethnobotanical Plant Extract Libraries, standard syllabus of ethnobotany for graduate and post-graduate courses, induct dedicated taxonomists and ethnobotanists in the colleges and Universities to teach the subject and guide research. The way forward for the discipline - Ethnobotany introduced and nurtured by Dr. Sudhanshu Kumar Jain is to take it to newer heights and help humanity.

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