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Ethnobotany and its relevance in contemporary research

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Abstract
Plants resources have served not only for the primary human needs but also for health care, since time immemorial. Indigenous knowledge is being recognized worldwide owing to their intrinsic value as well as potential instrumental connotation to phytodiversity conservation and modern drug development. Ethnobotany has played important role in the development of new drugs for many centuries and becoming increasingly important in defining strategies and actions for conservation or recuperation of residual forests. There is greater interest in ethnobotany today, than at any time in the discipline's history. This article analyses the relevance of ethnobotany in current scenario. It is anticipated that, in the future, ethnobotany may play an increasingly important role in sustainable development and biodiversity conservation.

Keywords: Ethnobotany, Drug development, Conservation, Benefit sharing

Introduction

Ethnobotany – An Introduction

People of all cultures have always depended on plants for their primary needs (food, shelter, warmth, medicines, etc.), and have naturally learned diverse applications of plants. In the course of nomadic roaming, this knowledge was exchanged with neighboring tribes, friends and foe, and was gradually expanded upon. Thus, plant knowledge has been passed around the world since the beginning of time, and frequently, the actual plants themselves have spread along as well. The investigation of plants and their uses is one of the most primary human concerns and has been practiced by all cultures since generations, though it wasn't called 'Ethnobotany'. The term "Ethnobotany" was coined by US botanist John William Harshberger in 1895.

Ethnobotany is coined with two terms i.e., "ethno" - study of people and "botany" - study of plants; *per se* it is the study of the relationship between plants and people. It is considered as a branch of ethnobiology and 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 (Schultes, 1992) [21]. 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. The relationship between people and plants has always been profoundly important. Plants play an important role in every aspect of our lives and without them life is not possible. Plants not only regulate the concentration of gases in the air, but also the only organisms capable of transforming sunlight into food energy on which all other forms of life ultimately depend upon. Given their extensive range of knowledge of medicinal plants, indigenous people remain the ultimate resource for retrieving this information for the purpose of application, particularly in modern medicine.

Ethnobotany can be categorized in two major groups. First is basic ethnobotany that includes compilation and organization of information about biota obtained from indigenous and other peoples, such as obtaining data about useful plants and animals, understanding how peoples manage their environments and learning about their lexicons and classifications. This is what we try to do in the best possible way, directly in the field from original sources. These results can then be organized in many ways once species determinations are completed. They may Basic quantitative and experimental ethnobotany includes basic documentation, quantitative evaluation of use and management and experimental assessment.

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. 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.

Ethnobotany and Traditional Medicine System

The Indian subcontinent, with the history of one of the oldest civilization, harbors many traditional health care systems. Besides Ayurveda, other traditional and folklore systems of health care were developed in the different time periods in the subcontinent, where more than 7500 plant species were used. According to a WHO estimate, about 80% of the world population relies on traditional systems of medicines for primary health care, where plants form the dominant component over other natural resources. The forests have been the source of invaluable medicinal plants since the time man realized the preventive and curative properties of plants and started using them for human healthcare. Tropical forests are particularly endowed with plants possessing curative properties. These richly biodiverse environments provide a veritable trove of flora containing compounds of medicinal value which indigenous people have utilized and benefited from for centuries.

Traditional medicine based on herbal remedies has always played a key role in the health systems of many countries. In India the native people are exploiting a variety of herbals for effective curing of various ailments. The plant parts used, preparation, and administration of drugs vary from one place to other. However, the knowledge of herbal medicines is gradually perishing, although some of the traditional herbal men are still practicing the art of herbal healing effectively. These plants are frequently used by the local inhabitants of the area for treatment of various diseases. The traditional knowledge, skill and practices thus developed are freely exchanged cared for and nourished as a common property of the communities (Pushpangadan, 2005) [17, 18]. 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.

Vast ethnobotanical knowledge exists in India from ancient time. Since 1950s the study of ethnobotany has intensified. Much work is now being done on the botany, pharmacognosy, chemistry, pharmacology and biotechnology of herbal drugs. The value of ethnomedicine has been realized; work is being done on psychoactive plants, household remedies and plants sold by street drug vendors. Statistical methods are being used to assess the credibility of claims. Some recent work in drug development relates to species of *Commiphora* (hypolipidaemic agent), *Picrorhiza* (hepatoprotective), *Bacopa* (brain tonic), *Curcuma* (antiinflammatory) and *Asclepias* (cardiotonic). A scrutiny of folk claims found 203 plants for evaluation. Less well known ethnomedicines have been identified that are used to treat intestinal, joint, liver and skin diseases.

Ethnobotany Today

Ethnobotany is a rapidly growing science, attracting people with widely varying academic background and interests. It is still predominantly linked to Economic Botany, and thus pursued to determine the potential economic value of various plants. There is a romantic allure to the life of an explorer and the promise of finding 'gold' in the form of plants or animals as potential sources for lifesaving drugs that could become important in the treatment of serious diseases such as AIDS and cancer. Plant ethnomedicinal findings may set the stage for targeting materials which can be meaningfully analysed for chemical activity using appropriate biodirected assays. This approach in search of new pharmaceuticals is woefully underutilized today to the detriment of human health and a number of new strategies should be considered for future advancements in drug discovery.

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. In interaction with the traditional areas of science, ethnobotany gives out several interrelated and interdisciplinary subjects involving aspects like, ethnomedicine, ethnoarchaeology, ethnobryology, ethnoecology, ethnoagriculture, ethnonarcotics, ethnopharmacology, etc.

Drug Development

Numerous ethnobotanical studies aimed at identifying new pharmaceutical products have been initiated in recent times. Ethnobotany has played important roles in the development of new drugs for many centuries. Drugs derived from plants along with their uses are presented in Table 1.

Table 1: Drugs derived from plants through ethnobotanical approaches

Drug/Chemical	Action	Plant Source
Acetyldigoxin	Cardiotonic	*Digitalis lanata* (Grecian foxglove, woolly foxglove)
Adoniside	Cardiotonic	*Adonis vernalis* (pheasant's eye, red chamomile)
Aescin	Antiinflammatory	*Aesculus hippocastanum* (horse chestnut)
Aesculetin	Antidysentery	*Frazinus rhychophylla*
Agrimophol	Anthelmintic	*Agrimonia supatoria*
Ajmalicine, serpentine	Treatment for circulatory disorders	*Rauvolfia sepentina*

Allyl isothiocyanate	Rubefacient	*Brassica nigra* (black mustard)
Andrographolide	Treatment for baccillary dysentery, hepatoprotective	*Andrographis paniculata*
Anisodamine	Anticholinergic	*Anisodus tanguticus*
Anisodine	Anticholinergic	*Anisodus tanguticus*
Arecoline	Anthelmintic	*Areca catechu* (betel nut palm)
Asiaticoside	Vulnerary	*Centella asiatica* (gotu cola)
Atropine	Anticholinergic	*Atropa belladonna* (deadly nightshade)
Berberine	Treatment for bacillary dysentery	*Berberis vulgaris* (common barberry)
Bergenin	Antitussive	*Ardisia japonica* (marlberry)
Betulinic acid	Anticancerous	*Betula alba* (common birch)
Bromelain	Antiinflammatory, proteolytic	*Ananas comosus* (pineapple)
Caffeine	CNS stimulant	*Camellia sinensis* (tea, also coffee, cocoa and other plants)
(+)-Catechin	Hemostatic	*Potentilla fragarioides*
Chymopapain	Proteolytic, mucolytic	*Carica papaya* (papaya)
Cocaine	Local anaesthetic	*Erythroxylum coca* (coca plant)
Codeine	Analgesic, antitussive	*Papaver somniferum* (poppy)
Colchicine	Antitumor, antigout	*Colchicum autumnale* (autumn crocus)
Convallatoxin	Cardiotonic	*Convallaria majalis* (lily-of-the-valley)
Curcumin	Choleretic	*Curcuma longa* (turmeric)
Cynarin	Choleretic	*Cynara scolymus* (artichoke)
Danthron	Laxative	Cassia species
Deserpidine	Antihypertensive, tranquilizer	*Rauvolfia canescens*
Deslanoside	Cardiotonic	*Digitalis lanata* (Grecian foxglove, woolly foxglove)
Digitalin	Cardiotonic	*Digitalis purpurea* (purple foxglove)
Digitoxin	Cardiotonic	*Digitalis purpurea* (purple foxglove)
Digoxin	Cardiotonic	*Digitalis purpurea* (purple or common foxglove)
Emetine	Amoebicide, emetic	*Cephaelis ipecacuanha*
Ephedrine	Sympathomimetic, antihistamine	*Ephedra sinica* (ephedra, ma huang)
Etoposide	Antitumor agent	*Podophyllum peltatum* (mayapple)
Gitalin	Cardiotonic	*Digitalis purpurea* (purple or common foxglove)
Glaucarubin	Amoebicide	*Simarouba glauca* (paradise tree)
Glycyrrhizin	Sweetener, treatment for Addison's disease	*Glycyrrhiza glabra* (licorice)
Gossypol	Male contraceptive	Gossypium species (cotton)
Hemsleyadin	Treatment for bacillary dysentery	*Hemsleya amabilis*
Hydrastine	Hemostatic, astringent	*Hydrastis canadensis* (goldenseal)
Hyoscyamine	Anticholinergic	*Hyoscyamus niger* (black henbane, stinking nightshade, henpin)
Irinotecan	Anticancer, antitumor agent	*Camptotheca acuminata*
Kaibic acud	Ascaricide	*Digenea simplex* (wireweed)
Kawain	Tranquilizer	*Piper methysticum* (kava kava)
Kheltin	Bronchodilator	*Ammi visage*
Lanatosides A, B, C	Cardiotonic	*Digitalis lanata* (Grecian foxglove, woolly foxglove)
Lapachol	Anticancer, antitumor	Tabebuia species (trumpet tree)
a-Lobeline	Smoking deterrant, respiratory stimulant	*Lobelia inflata* (Indian tobacco)
Monocrotaline	Topical antitumor agent	*Crotalaria sessiliflora*
Morphine	Analgesic	*Papaver somniferum* (poppy)
Neoandrographolide	Treatment of dysentery	*Andrographis paniculata*
Noscapine	Antitussive	*Papaver somniferum* (poppy)
Ouabain	Cardiotonic	*Strophanthus gratus* (ouabain tree)
Papain	Proteolytic, mucolytic	*Carica papaya* (papaya)
Phyllodulcin	Sweetener	*Hydrangea macrophylla* (bigleaf hydrangea, French hydrangea)
Physostigmine	Cholinesterase inhibitor	*Physostigma venenosum* (Calabar bean)
Picrotoxin	Analeptic	*Anamirta cocculus* (fish berry)
Pilocarpine	Parasympathomimetic	*Pilocarpus jaborandi* (jaborandi, Indian hemp)
Podophyllotoxin	Antitumor, anticancer agent	*Podophyllum peltatum* (mayapple)
Protoveratrines A, B	Antihypertensives	*Veratrum album* (white false hellebore)
Pseudoephredrine	Sympathomimetic	*Ephedra sinica* (ephedra, ma huang)
nor-pseudoephedrine	Sympathomimetic	*Ephedra sinica* (ephedra, ma huang)
Quinine	Antimalarial, antipyretic	*Cinchona ledgeriana* (quinine tree)
Qulsqualic acid	Anthelmintic	*Quisqualis indica* (Rangoon creeper, drunken sailor)
Rescinnamine	Antihypertensive, tranquilizer	*Rauvolfia serpentina*
Reserpine	Antihypertensive, tranquilizer	*Rauvolfia serpentina*
Rhomitoxin	Antihypertensive, tranquilizer	*Rhododendron molle* (rhododendron)
Rorifone	Antitussive	*Rorippa indica*
Rotenone	Piscicide, Insecticide	*Lonchocarpus nicou*
Rotundine	Analagesic, sedative, traquilizer	*Stephania sinica*
Salicin	Analgesic	*Salix alba* (white willow)
Santonin	Ascaricide	*Artemisia maritma* (wormwood)
Scillarin A	Cardiotonic	*Urginea maritima* (squill)

Scopolamine	Sedative	Datura species (e.g., Jimsonweed)
Sennosides A, B	Laxative	Cassia species (cinnamon)
Silymarin	Antihepatotoxic	*Silybum marianum* (milk thistle)
Stevioside	Sweetener	*Stevia rebaudiana* (stevia)
Strychnine	CNS stimulant	*Strychnos nux-vomica* (poison nut tree)
Teniposide	Antitumor agent	*Podophyllum peltatum* (mayapple or mandrake)
Tetrahydropalmatine	Analgesic, sedative, tranquilizer	*Corydalis ambigua*
Theobromine	Diuretic, vasodilator	*Theobroma cacao* (cocoa)
Theophylline	Diuretic, bronchodilator	*Theobroma cacao* and others (cocoa, tea)
Topotecan	Antitumor, anticancer agent	*Camptotheca acuminata*
Trichosanthin	Abortifacient	*Trichosanthes kirilowii* (snake gourd)
Tubocurarine	Skeletal muscle relaxant	*Chondodendron tomentosum* (curare vine)
Valapotriates	Sedative	*Valeriana officinalis* (valerian)
Yohimbine	Aphrodisiac	*Pausinystalia yohimbe* (yohimbe)
Yuanhuacine	Abortifacient	*Daphne genkwa* (lilac)
Yuanhuadine	Abortifacient	*Daphne genkwa* (lilac)

Source: Farnsworth *et al*., 1985.

Ethnomedical investigations have led to the development of important drugs such as reserpine (a treatment for hypertension) podophyllotoxin (the base of an important anti-cancer drug), and vinblastine (used in the treatment of certain cancers). Numerous drugs have entered into the international market through exploration of ethnopharmacology and traditional medicine (Bussmann 2002 [2]; Mukherjee and Wahile, 2006) [9] with extensive uses of medicinal plants. It is estimated that 25% of prescription drugs contain active principles derived from higher plants. The advent of high-throughput, mechanism-based *in vitro* bioassays coupled with candidate plants derived from pain-staking ethnopharmacological research has resulted in the discovery of new pharmaceuticals such as prostratin, a drug candidate for treatment of human immunodeficiency virus, as well as a variety of novel anti-inflammatory compounds.

In Africa, drug development based on ethnobotanical leads has followed two paths: the classical approach of identification of single plant species with biologically active compounds and the characterization and standardization of traditional recipes for reformulation as medicines. The first approach has led to the recognition of many African plants as medicines and the isolation of several biologically active molecules; examples range from the well-known physostigmine (from *Physostigmu venonosum*) used for the treatment of glaucoma to the recently identified antiviral agents from *Ancistrocladus abbreviutus*. The second approach which aims at optimization of mixed remedies as formulated dosage forms is perhaps more relevant to the needs of the poor rural populations but has remained largely ignored. Drug development programmes based on ethnobotanical leads must provide for just and fair compensation for individual informants and local communities (Iwu, 2002) [4].

The value of ethnomedical information in drug development is based on several factors: accuracy in recording or observing the medical use of the ethnomedical preparation, whether or not the ethnomedical use can be corroborated under scientific conditions in the laboratory, the formal or informal experience of the practitioner who provides the information, the role of the placebo effect and perhaps many others. Published ethnomedical information has many strengths and weaknesses relative to the ability to establish a corresponding biological effect in the laboratory. Many of the publications contain insufficient detail for the laboratory scientist. The ability to correlate ethnomedical reports with corresponding scientific studies could lead to improved selection of plants for further study in the areas of arthritis, cancer, diabetes, epilepsy, hypertension, malaria, pain, fungal and viral infections. This combination of analysing ethnomedical information and published scientific studies on plant extracts (ethnopharmacology) may reduce the number of plants that need to be screened for drug discovery attempts, resulting in a corresponding greater success rate than by random selection and mass bioscreening.

Despite widespread use of plant resources in traditional medicines, bioassay analysis of very few plant species have been conducted to investigate their medicinal properties, and to ascertain safety and efficacy of traditional remedies. The development of these traditional systems of medicines with the perspectives of safety, efficacy and quality will help not only to preserve this traditional heritage but also to rationalize the use of natural products in the health care. The plant species used by folklore may be explored with the modern scientific approaches for better leads in the health care. The intrinsic importance of these medicinal plants can very well prove as a potential source of new drugs (Mehrotra and Mehrotra, 2005) [7].

Harvesting of Plants

The harvesting of plants, meaning removal of plants or their parts for medicinal purposes, was considered as most important to healers to ensure long-term availability of the plants. Very often the exploitation of wild harvested resources (medicinal plants) has led to their severe degradation. Documenting the eroding plants and associated indigenous knowledge can be used as a basis for developing management plans for conservation and sustainable use of medicinal plants in the area. The principal threatening factors reported were deforestation, agricultural expansion and overgrazing. Learning of correct methods of harvesting was considered an essential part of local conservation efforts by healers. Most healers of Chhindwara, Madhya Pradesh indicated that no plant part should be removed until the plant is strong enough to withstand the loss. In general, it was felt that a mature plant should be chosen for removal of the required parts. The right method of harvesting varies according to the growth of the plant and nature of the cure. The time at which plant parts are harvested is also important. For instance, many healers, from Chhattisgarh believe that Saturday night is an auspicious time for harvesting. Saturday night harvesting and Sunday treatments are the most common practice among the local healers of Chhattisgarh. In addition, knowledge of special care or practices related to safer harvesting is also considered important. Most of the healers have revealed that their shadow should not fall on the plants while harvesting. Similarly, many healers would never remove the bark in a circular fashion,

avoiding a ring shape or complete removal from the stem. They believe that such a removal will permanently damage the xylem cells, which might lead to drying and death of the plants. In addition to these special practices, religious or holy ceremonies are also performed while removing the useful parts of the plants by healers. Many healers from Chhattisgarh offered a handful of rice and prayer to plants before they remove them. During such prayers, they appreciate the effectiveness of the medicinal plants and express their gratitude. Knowledge of planetary movement is also a part of their learning of ceremonial rituals by healers of Satpura region of Madhya Pradesh. "Certain plant parts should only be harvested on a full moon night to get the full vigour of the plant quality in the drug. During full moon nights, other planets in the universe remain calm so that the goddess of plants moves around in forest and showers her blessings". Traditional harvesting practices were taken into consideration while developing sustainable harvesting practices of medicinal plants in Madhya Pradesh and Chhattisgarh. Keeping the importance of harvesting on availability of plant we have standardized sustainable harvesting practices of some important medicinal plants e.g., *Andrographis paniculata* (Kalmegh), *Rauvolfia serpentina* (Sarpagandha), *Gymnema sylvestre* (Gudmar), *Tinospora cordifolia* (Giloe), *Celastrus paniculatus* (Malkangni), *Terminalia arjuna* (Arjuna), *Litsea glutinosa* (Maida), *Saraca asoka* (Ashoka), *Holarrhena antidysentrica* (Kutaj), *Bauhinia veriegata* (Kachnar), *Embelia tsjerium-cottam* (Baividang), *Phyllanthus emblica* (Aonla). However, there is a need for increased efforts to develop technologies to sustain their extraction. By adopting non-destructive harvesting practices these important valuable resources can be conserved (Pandey, 2009 [14]; Pandey and Shackleton, 2012 [15]; Pandey and Mandal, 2012) [15].

Income from collection and sale of medicinal plants is thought to be marginalized by lack of awareness regarding local and overseas market requirement, local shopkeepers, agents and medicine man. The consumers obtain supplies from individuals who have little experience in medicinal herb preparations or in understanding of its value. As a result valuable economic and medicinal plants are becoming rare and some are at the verge of local extinction. Therefore, efforts should be to conserve these valuable plants for future generations.

Processing of Plants

The useful plant parts are either given as medicine in raw form or are processed in a variety of forms. Processing of raw drugs is a key factor which influences the efficacy of drug. The most common processed forms reported are: crushed drugs, pastes, fresh juice, (dried) powders, decoctions, ash, *lehya* (semi-solid form derived by mixing powdered drug in a liquid base for ingestion), porridges, *lepa* (powder or paste in oil base for external application) and *dhoopa* (smoke for inhalation). Local healers have indicated that processing is an important skill which indirectly helps in conservation because proper processing of plant parts consumed less quantity of the plants and helped to ensure the whole plant was not uprooted. Processing also becomes critical when preparing the herbal formulations from toxic plants. For instance, poisonous plant like *Calotrophis procera* (Aak), *Gloriosa superba* (Kalihari) if taken orally, can be extremely dangerous for humans and animals. However, if taken processed herb in small quantity it will cure the diseases. Some healers use combinations of various plants in a variety of forms to make complex products. Some concoctions are given fresh while others are kept overnight for better results. The skill of storage is, therefore, also considered important. Most healers use earthen pots and avoid metal containers to store a concoction of liquid products overnight. Madhya Pradesh and Chhattisgarh Minor Forest Produce Federations have created small processing units in different parts of the Madhya Pradesh and Chhattisgarh. There is an urgent need to develop processing centres in other states.

Modern Approach

The application of scientific knowledge relating to bio-resources for human welfare demands data on socio-economic aspects, impact on environment or conservation of biodiversity. Ethics demands preservation of the knowledge base, capacity building among the indigenous people and fair sharing of benefits accruing from commercial use of the indigenous knowledge. Modern scientific approach to the study of ethnobotany demands precision in information, statistical support to data and quantitative or semi quantitative analysis of field observations (Martin, 1995; Jain 2004).

Tropical forests offer enormous prospects for the discovery of new drugs for use in modern medicine. Focusing attention on those plants used as medicines by indigenous peoples is the most efficient way of identifying the plants that contain bioactive compounds. There is an urgent need for more ethno botanists and ethno pharmacologists to document as much information as possible before the plants are lost through destruction of the forest and acculturation of the indigenous peoples.

About half of all known drugs are derived from natural products and their semi-synthetic derivatives. There are many approaches available for the selection of plants for drug discovery; however, the ethnobotanical approach to pharmaceutical lead drug discovery may significantly enhance the probability of identifying a potential drug molecule from medicinal plants. The method involves the integration of many disciplines including anthropology, botany, ecology, pharmacy, linguistics, medicine and ethnography (Iwu, 2002) [4].

Ethnobotany has once again become a recognized tool in the search for new pharmaceuticals. Initiatives by governmental agencies and the private sector have helped spark this renewal. Many of these projects are interdisciplinary, efforts involving scientists from the fields of anthropology, botany, medicine, pharmacology and chemistry. The concept of the "ethno-biomedical reserve" has been introduced. It provides an opportunity for pharmaceutical and herbal industries to contribute to the conservation effort. Terra Nova Rainforest Reserve is an ethno-biomedical reserve in Belize (Central America) that was given legal status in June of 1993.

Status of Traditional Knowledge

Many of the traditional methods and general knowledge of medicinal flora is being lost to time. As healers and tribal elders age and die, their knowledge is dying with them. Scientists are searching for ways to preserve this knowledge and to test them against contemporary diseases. Fewer than 5% of tropical forest plant species have been examined for their chemical compounds and medicinal value. This left great potential for even more discovery, but also the potential for great loss as forests are felled around the globe and unstudied species are lost to extinction. A study conducted in Chhindwara, Madhya Pradesh, India found that there is a profound and growing knowledge gap between old and younger generations. People of more than 50-65 years age

know a lot about wild plant products as compared to younger generation (Pandey and Bisaria, 1997) [11].

Benefit Sharing and Protection of Traditional Knowledge

In the context of evolving intellectual property law, defining ownership of traditional knowledge (TK) can be challenging when claims of origin are conflicting and requires accepting parameters of how uniqueness is defined and patent law is applied to protect this information. Changing laws and policies are globally affecting the way traditional knowledge is valued and protected. Within this context, suitable types of benefit sharing can only be achieved if appropriate mechanisms are in place to prevent exploitation. Evolving mechanisms and laws are beginning to impact on how TK can be utilized to achieve appropriate benefits for those who are custodians of these types of information. This is not an easy task since issues related to ownership and ways to ensure appropriate protection, oversight and disbursement of the revenues are always likely to arise. The premise of biodiversity prospecting is that appropriate policies and institutions are needed to ensure that the commercial value obtained from genetic and biochemical resources are a positive force for development and conservation (Reid *et al*. 1993) [20]. Much depends upon the application of current national and international laws and the acceptance within and among nations to work towards logical solutions. Critical to this evolving process is the acknowledgement that a great deal of valuable TK is being lost not only by its unsuitable dissemination but because a fitting international repository does not exist to safeguard this knowledge while workable options to address its worth are being examined.

Education Opportunities

There is more interest in ethnobotany today, than at any time in the discipline's history. Ethnobotany, however, suffers from many deficiencies, especially the lack of research support, educational opportunities, and a theoretical basis. Ethnobotanists should expand the definition of ethnobotany to include all plant-people interactions, not just those of traditional societies. They also must integrate more effectively with colleagues in related disciplines and promote ethno botany's relevance to Introductory Botany and other courses. Ethnobotany and ethno biology are natural links to conservation biology, resource management, and environmental education. Expanding ethno botany's scope to include all plant and human interactions greatly increases the funding, research, and job opportunities for the discipline (Bradley, 2005) [1].

With the intention of taking students back to grandmother's remedies and to the wonders of traditional medicine, the National Medicinal Plants Board, Govt. of India New Delhi is introducing the concept of herbal gardens in various schools across the country from early 2010. As per the NMPB, the herbal gardens project will initially cover 1,000 schools in 50 districts across the country.

Conclusion

Ethnobotanical research can provide a wealth of information regarding both past and present relationships between plants and the traditional societies. Ethnobotany may also prove an important tool in the search of new pharmaceuticals. In addition to its traditional roles in economic botany and exploration of human cognition, ethnobotanical research may be 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 development and biodiversity conservation.

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