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An Introduction to Ethanobotany, Concept, History Importance and Scope

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Introduction-the term ethanobotany was coined by J.W. Harshberger, an American botanist at the University of Pensylvania, in 1895. Ethanobotany is the systematic study of the relationships between plants and people though initially it was used to describe the study of plants used by primitive and aboriginal people. In other words Ethanobotany means all the sources of the plants towards humankind and the other species growing on the planet. From the ancient time, people have used plants to provide them food, fodder, medicines, clothes, fibers, crafts, dyes, soaps and detergent, dyes, novel compounds, materials for construction. Ethno (as in ethnic) refers to people, culture, a culture collective body of beliefs, knowledge, language and practice. Botany is the study of plants.

The scope of Ethanobotany – the scope of this is increasing day by day. To describe the field in broader sense ethnobotanists have given their definitions time to time.Jones (1941) defined Ethnobotany as _the study of interrelations of primitive man and plants‘. According to Schultes (1962), Ethnobotany is defined as the study of the relationships which exist between plants and people of a primitive society and their plant environment‘.Vartak and Gadgil (1980) suggested _Ethnobotany is a branch of economic botany, a section of which deals with the role of plants in life and culture of aborigines and tribal people‘.Alcom (1984) states that Ethnobotany is the study of contextualized plant use.Jain (1987) applied the term Ethnobotany as the total natural and traditional relationship andinteraction between man and his surrounding plant wealth. Wickens (1990) defined Ethnobotany as the study of useful plants prior to their commercial exploitation and eventual domestication.According to ford 1994, Ethanobotany is concerned with a wide range of interest of plants in cultural and ecological context.Turner (1996) has given an appropriate definition that is –the Science of people‘s interaction with plants‖.Ethanobotany is the use of plants in material or abstract form among ethnic communities or tribal people. Sometimes, it is regarded as ethnographical or anthropological or tribal botany. Ethanobotany is a combination of ethnography and botany. Ethnographers describe the people of a region including their race, language and their uses of plants.Ethanobotany is an interdisciplinary science and undertakes a research on the relationship between plants and humans in the areas of: nutrition, education, archaeology, linguistics, healing, paleology, livelihood, medicine, agriculture etc. The scope of the subject has expanded greatly. Botanists, anthropologists, social scientists, and the practitioners of indigenous medicines are engaged in the study of people-plant interactions in naturalenvironment.

History and Concept-The term Ethnobotany was coined by the early 20th century botanist John William Harshberger. The roots of ethnobotanical science can be traced in the ancient Sanskrit, Arabic literatures, Greek, ethnographics, travelogues etc. Vast ethanobotanical knowledge exists in India from ancient time. A variety of uses of plants are mentioned in the ancient Indian Sanskrit literature, e.g. Rigveda, Atharvaveda, Upanishads, Mahabharata and Puranas etc. These include plants used in worships, as medicines, tools of agriculture, food, fuel etc. A list of some of the importance Indian treatises is presented in two vedic periods Rigveda and Athervaveda 148 medicinal plants are included in Charaka Samhita 400-450 medicinal plantsare included.

Pent-s'ao, the treatise on herbs written by Emperor Shah Nung has references to 365 drugs. It has also been reported that hundreds of drugs including important species, i.e., henbane, pomegranate, opium, poppy, aloe and onion were commonly used by the Egyptians. Ethanobotany has developed in the recent past into an important scientific discipline. The central issues in the ethnobotanical studies involve the interaction between plants and peopleand foremost among these are the management of plant diversity by indigenous communitiesand the traditional use of medicinal plants

Importance of Ethanobotanical study-The Significance of ethanobotany is manifold. Since humans came into existence we have been using plants as medicines and food. Ethanobotanist study how people in different areas and different cultures have used plants throughout history. This area of study has become more popular as people around the world have become more interested in the medicinal qualities of plants. Beginning in the twentieth century, the field of ethanobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual reorientation. The study of indigenous food production and local medicinal knowledge may have practical implications for developing sustainable agriculture and discovering new medicines. Ethanobotany also encourages an awareness of the link between biodiversity and cultural diversity, as well as a sophisticated understanding of the mutual influences (both destructive and beneficial) of plants and humans. Ethanobotany, in totality, is virtually a new field of research, and if this field is investigated thoroughly and systematically, it will yield results of great value to the ethanologists, archaeologists, anthropologist, plant-geographers and pharmacologists etc. The knowledge of ethanobotany plays a vital role in the primary health care and economy of the tribals and aboriginal populations of our country and has potential for the discovery of new herbal drugs and new sources of nutraceuticals etc. The agricultural practices are not technologically advanced and most tribal groups in north-east part of India resort to shifting cultivation widely known as Jhum. Jhuming or shifting cultivation involves felling of forest trees, clearing of shrubs and undergrowth in limited area and turning of soil for sowing crops. Ethanobotany contributes to an understanding of agriculture in two ways:

1- By explaining and describing the many different ways the same crop can be raised, whether for economic gain, a desire for sustained yield, or other culturally specific purposes.

2- By revealing ways to create genetically altered plants are almost the exclusive source of drugs for the majority of World population even today. Plant products constitute approximately 25% of the total prescribed medicines even in developed countries like U.S.A. Use of plants in folk medicine is very Prevalent in Central India (Jain, 1963, Jain and Tarafder, 1963). The record of use of herbal medicines in India is very ancient. India with diverse ethnic groups and rich biodiversity has a century old heritage of medicinal phototherapy for the treatment of various diseases and promotion of health.

The Botanists collects the information regarding the traditional uses of many plant species which are unknown to modern society from tribals. Anthropologists have to deal with the cultural aspects of the life of tribal people.

The ethno botanical studies throw light on certain unknown useful plants and new uses of many known plants which can be exploited for developing new sources for some plant products and agro based industries such as, food processing, fibres and floss, cordage and basketry, extraction of edible and non edible oils, gum, resins, tannin, dye extraction for the upliftment of tribal communities.

The study of ethno botany provides valuable information to the scientists, planners and administrators for the preparation of action plan for the economic emancipation of tribals and Eco development of tribal areas.

Role of Ethanobotany in conservation of natural resources-The importance of Ethanobotany is that it has an important role to play in conservation of nature and culture, and in particular, the biological diversity and the diversity of traditional human cultures. Indigenous knowledge of food and medicinal plants can add value in the overall conservation and sustainable management of natural habitats and ecosystem. The indigenous knowledge which is transmitted from their ancestors is being well maintained as guarded secret. Local knowledge provides new insights and opportunities for sustainable and multipurpose use of resources and offers contemporary strategies for preserving cultural and ecological diversity. In recent years conservationists have realized that the maintenance of protected areas is closely linked to rural development. Indigenous people (particularly those that depend on forests) regularly face the threat of biodiversity loss, a factor that may affect their quality of life due to land degradation and deforestation. It is important that local indigenous peoples be given opportunity to conserve their own culture. Local people should be part of a conservation programme. *In-situ, ex-situ*, cryopreservation etc are discussed below-

1- **In situ conservation:** The conservation of genetic resources through their maintenance within natural or even human made ecosystems in which they occur, is called in-situ conservation. It is the process of protecting an endangered plant or animal species in its natural habitat. This method preserves both the population and the evolutionary process that enable the population to adapt by managing organisms in their normal state or within their normal range. For example, large ecosystems may be left intact as protected reserve areas with minimal intrusion or alteration by humans. In India, ecologically unique and biodiversity-rich regions are legally protected as biosphere reserves, national parks, Sanctuaries, nature reserves, reserved forests. India now has 14 biosphere reserves, 90 national parks and 448 wildlife sanctuaries.

2- **Ex-situ conservation** is the conservation of plants away from their areas of natural occurrence. The knowledge of ethanobotany is important to manage plants in the landscape for better watershed management. For watershed development and management, the contribution of local people's knowledge, consortium approach and adoption of new technology are important to achieve desired result for insuring sustainable utilization of natural resources in a given watershed. The watershed approach enables planners to harmonize the use of soil, water and vegetation in a way that conserves these resources and maximize their productivity. The impact of resource conservation in a Shivalik micro watershed was studied 10 years after imposition of protection. The main activity taken up in the micro watershed was the construction of an earth fill dam in 1992 at the outlet to runoff water from a contributing area of 59.6 ha consisting of sparse vegetation. Ex-situ conservation and maintenance of samples of living organisms outside their natural habitat, in the form of whole plants, seed, pollen, vegetative propagules, tissue or cell cultures. This involves conservation of genetic resources, as well as wild and cultivated or species, and draws on a diverse body of techniques and facilities. Botanical gardens play a key role in ex-situ conservation of medicinal plants. In India, we have a network of 140

botanical gardens which includes 33 botanic gardens attached to the Universities. Some of these are meant for medicinal plants and there are exclusive herbal gardens (National Botanic Gardens, now NBRA- National Botanical Research Institute) at Lucknow and Tropical Botanic Garden and Research Institute at Palode (TBGRI- near Tiruvananthapuram) have medicinal plants wings.

Ex-situ conservation provides excellent research opportunities on the components of biological diversity.

3- **Cryopreservation** is the process of freezing biological material at extreme temperatures; most common-196^{0}C / -321^{0}F in liquid nitrogen (N_2). The objective of cryopreservation is tominimize damage to biological materials, including tissues, mammalian cells, bacteria, fungi, plant cells, and viruses, during low temperature freezing and storage. Cryopreservation technology is important to preserve the genetic diversity of a particular plant or genetic stockfor its use at any time in future.

In India, 4.5 % of total geographical area constitutes protected area network, comprising eight designated biospheres, 87 national parks, and 447 wildlife sanctuaries. These protected areas harbour large varieties of medicinal plants.

The Himalayan region is blessed with an immense amount of natural resources such as forest, water and wildlife. The local inhabitants have been dependent upon indigenous plant resources for their daily needs. The people of the Himalayan region are well aware of valuable species of medicinal and aromatic plants. These are now under stress due to over- extraction. Conservation of these valuable resources is now crucial. The wise use, development and conservation of our natural resources is every individuals duty india has about 563 tribal communities having past traditional knowledge through their long association with the forests. They have collected valuable knowledge on the use of wild plants in their daily life for food, fuel, fodder, clothing, health-care and other purposes. Many native people also use plants in ceremonial or spiritual rituals. Most of the traditional knowledge about plants and their uses in fast disappearing as a consequence of socio- economic and land use changes. The ethnobotanical studies through light on certain unknown useful plants and new uses of many known plants which can be exploited for developing newsources for some plant products and agro based industries. Botanical Survey of India initiatedrecording and documenting this ethnobotanical data of all tribes belonging to the states of Bihar, Goa, Karnataka, Orissa, Rajasthan, Himachal Pradesh, Chattisgarh, Uttarakhand, Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Jammu and Kashmir, Madhya Pradesh, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal for critical studies leading to sustainable utilisation of bioresources, documentations of traditional knowledge system.

The tribals and natural populations living in different parts of India use plant species of forest floras for food, fodder, fibres house building, fuels, medicines, beverages, oils, gums, resins, dyes, basketry, timber and wood works, musical instruments, fish poisons, religious ceremonies, narcotics etc. About 5000 plant species have been recorded so far which are usedby tribals and aboriginal communities in different states.

Plants used by tribal people-Indigenous people are those who retain knowledge of the land and food resources rooted in historical continuity within their region. The food systems of Indigenous people often included ―traditional foods‖, that is, which indigenous people have access to locally, without having to purchase them, and within traditional knowledge and the natural environment from farming or wild harvesting. Tribals take shelter from forest and utilize wild edible plants bothraw and cooked. Forest plays an important role in enhancing livelihood requirements for ruralcommunity. Over 50 million tribal people

in India belong to 550 communities of 227 ethnic groups (1-3) and about 60 % of the rural communities directly rely on forest for their day-to- day requirement. The flower and fruits are generally eaten raw where as tubers, seeds and leaves are cooked. There is an enormously larger number of plants that are potentially edible(about 30,000 species), including about 7,000 species that are being utilized locally by indigenous peoples as nutritious sources of food.

Tribal people through their hereditary traditional knowledge know about the useful and harmful effects of plant food. The foods, habits of people are developed on the basis of experience and survival through successive generations.

Earliest food gathering man gathered fruit, nuts, moss, tubers, mushroom, morels and stems in season. Now they are fully aware how to exclude the substances from the wild plants and preparing recipes for their meager meals. A list of some wild plants used as food is given below:

1- *Bombax ceiba,* verna. Semal, Family-Bombacaceae. The flowers and young fruits are eatenas vegetable.

2- *Cassia fistula*. Verna. Amaltas, Family-Caesalpiniaceae. The flower buds and the flowersare used as vegetable by tribals.

3- *Emblica officinalis*. Verna. Amla. Family- Euphorbiaceae. The fruits are eaten raw orcooked.

4- *Ficus religiosa.* Verna. Peepal, family- Moraceae. The leaf buds are used as vegetable.

5- *Holostemnia annulare.* Verna. Dudhi, family- Asclepiadaceae. The leaves are used withpulses to make curry.

6- *Indigofera pulchella,* verna. Jirhul, family- papilionaceae. The pink flowers are eaten asvegetable.

7- *Leucas cephalotes,* verna. Durup, family-Lamiaceae. The leaves are used as vegetable.

8- *Madhuca latifolia,* verna. Mahua, family-Sapotaceae. The flowers are eaten fresh and dry. The fruits are eaten as vegetable. A spirit prepared from flowers is considered as tonic and nutritive.

9- *Moringa oleifera.* Verna. Sainjana, Family- Moringaceae. The pods and flowers are usedas vegetable.

10- *Randia dumetorum*. Verna. Maurea, Family- Rubiaceae. The leaves are used as vegetable, and the ripe seeds are edible.

11- *Shorea robusta,* verna. Sal, Sakna, Sarjan, Daru, Family-Dipterocarpaceae. The seeds areeaten by the poor as a famine food.

12- *Terminalia cremulate.* Verna-Asan, Family- Combretaceae. The hard gumming exudates from the stem is called _asan-latha' is eaten and considered delicious.

13- *Dioscorea bulbifera.* Verna- Gethi kanda. The yam is cut into slices, boiled and kept in running water and eaten

Scope of Ethanobotanical Studies- Ethnobotanists engage in a broad array of research questions and practices, which do not lendthemselves to easy categorization. However, the following headings attempt to describe someof the key areas and scope of modern ethnobotanical study.

1- Archaeoethnobotany: Archaeoethnobotany involves three subjects namely, archaeology, ethnology, and botany. This interdiscipline of ethanobotany studies the identification of plant materials from archaeological sites for studies on migration of human cultures, and origin, dispersal and domestication of crops, etc, (Smith J., 1965).

2- Ethnoecology: Ethnoecology is the scientific study of the past and present interrelationships between human societies, and their living and non-living environment. It seeks valid, reliable understanding of how humans have interacted with the environment and how these intricate relationships have been sustained over time.

3- Ethnomedicine: includes research that deals with medicines derived from plants, animals,minerals, etc., and used in the treatment of various diseases and ailments, based on indigenous phurmacopoeia, folklore

and herbal charms (Weiner, 1971). Ethnomedicine is a sub-field of medical anthropology that deals with the study of traditional medicines—not only those with relevant written sources (e.g., Traditional Chinese Medicine and Ayurveda), but also those whose knowledge and practices have been orally transmitted over the centuries.

4- Ethnogynaecology**:** is an emerging discipline that deals with various diseases among women in tribal societies, related to sterility, conception, abortion, etc.,

5- Ethnomusicology: is defined as ‒the study and cultural aspects of music and dance in local and global contexts‖. It also includes the study of musical instruments they make and use, which are often made of plant materials.

6- Ethnomycology: is the study of mushrooms and other fungi by common people, as food or medicine, or in crafts, stories, or rituals.

7- Ethnonarcotics: deals with study of the use of narcotics, snuffs, hallucinogens, etc, in primitive human societies.

8- Ethnopharmacology: is the scientific study correlating ethnic groups, their health, and how it relates to their physical habits and methodology n creating and using medicines. This is a key field that often explains the effectiveness of herbal medicine, stimulants, analgesics, inebriants or psychoactive species. Both ethnomedicine and ethnopharmacology overlap significantly with ethnobotany.

9- Ethnotaxonomy: The term ethnobotany refers the naming and classification of plants and their cultivars, and animals and their races by human societies in their language. Ethnotaxonomy studies the ethnic concepts of classification of plants based on habit, habitat, colour, odour, usage or some other parameters.

10- Ethnotoxicology: Study of use of various plants as fish poison (Ichthyotoxic), arrow poisons etc., in human societies. The adivasis possess immense knowledge on procurement of wild food using poisonous crude drugs.

11- Paleoethnobotany: deals with the identification of fossolized plant materials and remains for studies on ancient plant economy, palaeoethnobotanical history of crops and changing patterns. On the use of plant life by human culture (Stewart, 1976). Major research themes are recovery and identification of plant remains, the use of wild plants, the origins of agriculture and domestication, and the co-evolution of human-plant interactions.

Conclusion-Ethanobotany is the systematic study of the relationships between plants and people. The term Ethanobotany was coined by J.W. Harshberger. Ethanobotanical studies involve the interaction between plants and people and the management of plant diversity by indigenous communities and the traditional use of plants. India has been the most ethnically diverse nation on earth for many centuries. Ethanobotany encourages an awareness of the link between biodiversity and cultural diversity. The study of ethanobotany provides valuable informations to the scientists, planners and administrators for the preparation of action plan for the economic emancipation of tribals and eco development of tribal areas. Ethanobotany has an important role in conservation of natural resources through in-situ, ex-situ, cryopreservation etc conservation programmes. The tribals living in different parts of India use plant species for food, fodder, fibres house building, medicines etc. Areas of Ethanobotanical studies are Archaeoethanobotany, Ethnomedicine, Palaoethanobotany etc. The use of narcotics, snuff, hallucinogens etc, in primitive human societies have been since the beginning of recorded history.

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