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Review Article

TRIBAL PEOPLE AND PLANTS: OUTLOOK OF AN ETHNOBOTANICAL STUDY FROM RAJASTHAN, INDIA

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ABSTRACT
This article describes the significant role of indigenous people who have conserved the biodiversity in and around rural areas of Rajasthan. . Plants are conserved by these ethnic and indigenous people that serve as a source of medicine for curing various ailments.. Some of the indigenous cultivars conserved by these ethnic people are used in agricultural cultivars improvement programmes to increase productivity and incorporate traits for increasing resistance against different pests and diseases. Plants are conserved in abandoned sites of shifting agriculture by indigenous people .Micropropagation protocol has been established for selective ethnomedicinal plants facing the danger of extinction for their regeneration.

Key Words: *Ethnobotany, Rajasthan*

INTRODUCTION
Medicinal plants are the potent source of life saving drugs for the majority of world's population. It is estimated that 70-80% of people world-wide rely mainly on traditional, largely herbal medicines to meet their primary health care needs and have gained renewed interest for various reasons, affordability, low pricing, little or no side effects, their solutions for chronic diseases and disorders time tested remedies and several preventive approaches. Over the years herbal medicines have gained upward trend for consumption especially with the development and standardization of herbal medicines (Malik *et al.,* 2008).
Plant based drugs have a long history in both traditional and modern societies as herbal remedies or crude drugs, or as purified compounds approved by the Food and Drug Administration and similar regulatory agencies. According to one estimate 20,000 to 35,000 species of plants are used as medicines, pharmaceuticals, cosmetics and nutraceuticals by different ethnic groups the world over. In most of these species active principles are exploited in modern medicines and referred to as plants of scientific knowledge(Abbas *et al.,* 1992, Agarwal 1981)
Drug discovery from plants still provides important novel drugs, many of which are approved or have undergone trials for clinical uses against cancer, malaria, Alzheimer's disease, HIV/AIDS, pulmonary pathologies and other deadly diseases.
Enhanced market demands have posed threats to phytoresources due to unscrupulous mode of collections. There is an urgent need to conserve genetic diversity of medicinal plant resources by developing protocols for micro propagation. Plant, cell, tissue, organ culture techniques offer an integrated approach for rapid multiplication and production of material with dependable active ingredients. The conventional cultivation of some of the medicinal plants is relatively expensive and production of medicinal compounds can be elicited *in vitro.* Due to extensive utilization of medicinal plants for medicine and scientific research, many of them are facing extinction; therefore it is imperative to adopt alternative methods for rapid multiplication of such plants (Billore, 1982)

Review Article

In the recent tissue culture years, tissue culture has emerged as a promising technique to obtain genetically pure elite populations under *in vitro* conditions. *In vitro* propagation also called micro propagation or clonal propagation is in fact the miniature version of conventional propagation which is carried out under aseptic conditions. Micropropagation provides a fast and dependable method for production of a large number of uniform plantlets in a short time. Plant secondary metabolites are economically important as drugs, fragrances, pigments, food additives and pesticides. Biotechnological tools are important for the multiplication and genetic enhancement of the medicinal plants by adopting techniques such as in vitro regeneration and genetic transformation. It is also harnessed for the production of secondary metabolites using plants as bioreactors. Advances in tissue culture combined with improvement in genetic engineering techniques specifically transformation technology have opened new avenues for high volume production of pharmaceuticals, nutraceuticals and other beneficial substances. Recent advances in the molecular biology, enzymology and fermentation technology of plant cell cultures suggest that these systems may become a viable source of important secondary metabolites. Large scale use of plant tissue culture is found to be an attractive alternative approach to traditional methods of plantation as it offers a controlled supply of biochemical independent of plant availability. The production of secondary metabolites could be enhanced using bioreactors and has a tremendous potential for the large scale synthesis of therapeutically active compounds in medicinal plants. The major advantages of a cell culture system over the conventional cultivation of whole plants are: (1) Useful compounds can be obtained under controlled conditions independent of climatic changes or soil conditions; (2) Cultured cells would be in aseptic environment; (3) The cells of any plants, tropical or alpine, could easily be multiplied to yield their specific metabolites; (4) Automated control of cell growth and rational regulation of metabolite processes would reduce labour costs and improve productivity; (5) Organic substances are extractable from callus cultures.

According to Alferman *et al.,* (2003), many attempts have been made to use in vitro culture for commercial production of plant secondary metabolites; however, most of these attempts have not been feasible. Only few commercially viable in vitro secondary metabolite production systems have been created including shikonin (*Lithospermum erythrorhizon*), ginsenosides (*Panax ginseng*), purpurin (*Rubia akane*), and paclitaxel (*Taxus* spec.). Alferman *et al.,* (2003) resolved that the lack of significant application was due to several factors including a lack of storage cells for accumulation of secondary metabolites. In addition, Preil (2005), blamed lack of progress specifically on the high cost of bioreactors, slow growth of plants, and low yields of active metabolites. The first experiments conducted used callus and suspension culture of undifferentiated cells as a method for production of secondary metabolites. Despite significant limitations, cell suspension culture has been successfully exploited commercially for production of secondary metabolites. Taxol, paclitaxel, is a compound with anticancer properties that was originally extracted from leaves and bark of plants of the genus *Taxus.* This compound is being successfully produced via cell suspension culture by Phyton Biotech (Germany) in 70,000 L bioreactors (Wink *et al.,* 2005). In most instances, however, callus culture fails to produce significant quantities of medicinal compounds because of the need for compartmentalization of cellular synthetic processes which require differentiation for proper pathway functionality (De Luca and St Pierre, 2000). Immobilization of suspension cultures was originally conceived as a possible enhancement of the system to allow the productive cells to be maintained while the bioactive compounds were removed with the majority of the media (Baldi *et al.,* 2007).

Immobilization of *Capsicum* cell cultures allows for continual production of capsaicin in vitro (Johnson *et al.,* 1990).

Ethnobotany is the study of the close relationship between plants and people. Ethnobotany is considered a branch of ethnobiology. Ethnobiology and human ecology are two important disciplines and have a great significance for welfare of human beings and animal world. Ethnobiology is now emerging as a holistic approach of ecology; actually enthnobiology deals the study of records and documents the age old knowledge and wisdom of the traditional, people about the miraculous properties of biodiversity.

"Ethnobotany" term was first applied by Harshberger in 1895, to the study of plants used by primitive and aboriginal people. The term has been variously defined and interpreted by subsequent workers. Jones (1941) defined it as the study of the inter-relations of primitive man and plants. Schultes (1962) interpreted ethnobotany as usually the study of relationship which exists between people of a primitive society and their plant environment.

The term aboriginal people refer to tribal people. In Rajasthan, Southern part comprising Banswara, Dungarpur, Sirohi, Udaipur and Pratapgarh is the tribal belt. Rajasthan has a vibrant history and culture, be it in their royal forts or their tribes spread over various regions and specially in southern Rajasthan. Each tribe is different from each other and represent a very distinct heritage from the rest of the civilized population. Tribals of Rajasthan constitute around 13.5% of Rajasthan's populations. Bhils and Minas constitute the majority of population of the tribes of Rajasthan. Infact, they were the original inhabitants of the area where Rajasthan stands now. Apart from these main tribes, there are also a number of smaller tribes in Rajasthan like Garasiya, Sahariya. However all Rajasthan tribes share common traits, the variation lies in their costumes, jewellery, festivals, fairs, customs, practices etc.

The tribes have been classified into scheduled tribes, denotified tribes, nomadic tribes, semi nomadic tribes. The schedule tribes is the largest class which consists of Bhils, minas, damor, dhanka, garasia, kathodi, kokna, koli, nayaka, patelia, sahariya. The second class denotified tribes includes Baori, kanjar, sansi, mogia, bagri, nut, naik, multanis, bhat. Nomadic tribes include baldias, pardhis, domabaris, gadialohars, iranis, etc**.** Semi nomads includes rebaris, sarangiwala bhopas, jogis, janglus, kannis, sindlus etc. (Mishra *et al.,* 1992)

The focus of ethnobotany is how the plants have been or are used, managed and perceived in human societies and includes plants used for food, medicine, cosmetics, dyeing, and textiles, for building tools, currency, society life and music.

Ethnobotany deals with the direct, traditional and natural relationship between human society and plants. It has been recognized as multidisciplinary science comprising many interesting and useful valuable aspect of plant sciences, history, anthropology, culture and literature its significance has been realized chiefly in respect of various economic uses of plant among the primitive human societies. Ethnobotany brings to light numerous known or unknown uses of plant which have potential of wider usages. Beginning in the 20th century, the field of ethnobotny experienced a shift from the raw completion of data to a greater methodologiocal and conceptual re-orientation, thus is also the beginning of academic ethnobotany. Ethnobotanical studies on utilization of plants by the rural folks including tribals have gained much importance in the recent past all over the world. In this a lot of work has been carried out both at national and regional levels (Pandey, 1989)..

To have better knowledge about ethnobotany, an ethnobotanical study of medicinal plants was carried out in rural areas of Rajasthan. Information was obtained through interviews using semi-structured questionnaires and field excursion with indegenous peoples, traditional medicine-man

(vaids) and herbal medicine collectors were carried out. Shepherds, bhopas, birth attendants, aged women and men, woodcutters, hunters, headmen of the community were interrogated for the first hand information on ethno medicinal plants. The field tours for study were made at regular intervals in order to cover the tribal areas in different seasons to collect the maximum information at the time of marriage ceremonies, local tribal fairs and Local HAATS. Thus many plants from different part of rural areas of Rajasthan at random were collected to evaluate the medicinal properties which are traditionally used by the tribals of Rajasthan from ancient periods for ethno medicinal purposes.

During the ehnobotanical survey we approached to a point that the tribal communities around rural areas of Rajasthan use diverse flora in treatment of various ailments and local people possess rich traditional knowledge of medicinal plants.

The variety of medicinal plant species used and the related local knowledge are of great value to the tribal community and their preservation and conservation is of great importance. The therapeutic uses of the documented medicinal plants provides basic data for further research focused on their drug action and conservation of the most important species. The study shows that these regions retain a wide diversity of plant species used as remedies for several ailments. Such plants are very useful especially to people who cannot afford modern medical facilities or hospitals are not in their access. The knowledge and use of the flora around them for treatment of various ailments among the tribal people is still part of their daily life and culture and this calls for preservation of the uprightness of the forest and native knowledge of herbal medicine use. The documented plants have potential of being used in drug development as they cause less side effects and are effective too(Praveen *et al.,* 2007).

Today the importance and utility of medicinal herbs are subject more of argument and speeches, than of actual research or promotional work. Why such a situation? When developed countries were busy researching on their native plants and exploring newer uses and newer sources of useful constituents, we only talked of our glorious past, our miracle herbs and our wealth of past knowledge, we remained complacent. On the other hand, we welcomed the increasing number of western molecular drugs with such enthusiasm that we gradually lost interest in Ayurvedic and Unani medicines of even proven efficacy. Most of us never tried to know, or even think, whether any of our medicinal plants also had read useful properties.

Recently global interest in the study and research and practices of crude drugs particularly the tribal medicine has therefore considerably increased during, the last three decades because of growing awareness about the toxicity and side effects of allopathic (western) drugs. The revival of interest in natural drugs especially those derived from plants started in the last decades mainly because of the wide spread belief that green medicine are healthier and safer than synthetic drugs.

W.H.O. gave the formal recognition to the traditional medicine and recommended to associate the traditional healers in the national health care programme during 29th and 30th Assemble which organized in 1976 & 1977. W.H.O. has estimated that at least 80% of the people in the world rely on traditional system of medicine for their primary health care needs and these systems are largely plant based. All oldest cultures of the world traditionally used plant medicines both for primary health care and as a house hold remedies. In many of these countries, like those of India and China, this cultural knowledge is well documented.

Medicinal plants are value added for the content and chemical composition of their active principles. Therefore, the demand on plant based therapeutics has increased many fold in both developing and developed nations due to growing recognition that they are natural products

being non-narcotic, having no side effect and easily available at affordable prices. In a wider context, there is a growing demand for plant based medicines, health saving products pharmaceuticals, nourishing and food supplements cosmetics, herbal tea, herbal paints, essential oils and flavours etc. According to a survey, international market of medicinal plant or plant based drug is over US $ 60 billion per year which is growing at the rate of 7 percent per year.

Progress in research works on ethno-medicinal plants has undergone a phenomenal growth during the three decades; worldwide trend towards the utilization of natural plant remedies has created an enormous need for information about the properties and uses of medicinal plants.

India is known for its wealth of medicinal plants which are found in its diverse climatic and physiographic condition. This has enriched us with an estimated 45000 plant taxa of which 2000 are referred to frequently in literature. The early 20^{th} century saw an evolution of the pharmaceutical industries with the development in chemical techniques, crude drugs came to be replaced by pure chemicals drugs and the developed countries witnessed a decline in popularity of medicinal plant based drug. However, during the recent past the pendulum has swung back again and there is a resurgence of interest in study and utilization of medicinal herbs.

The above text reveals that ethnobotany is an emerging field of botanical research which has gained importance in the last few decades due to the changes in the environmental, social, developmental and other properties. It has created interest among the development of the local inhabitants. They are attracted to the field of ethnobotany for cultural medicinal and ecological interaction (Choudhary, 2007).

In Rajasthan which is one of the largest states of India, a lot of work has been done in past three decades regarding subject. The present investigation is also related with ethnobotanical especially ethnomedicinal importance of plants growing in Rajasthan. Deforestation, urbanization, industrialization, transmigration, colonization and other developmental activities have threatened not only the biological resources but also the traditional culture and ethnobotanical knowledge (Singh and Pandey, 1998)

The valuable knowledge of Phytotherapy is getting endangered as our past generations have taken its benefits but our present generation is not keenly interested as they think that this therapy is very superstitious thus we need to save this knowledge by creating awareness by which its untapped potential could be fully utilized. Hence, there is an urgent need to record and preserve the age long folklore and practices before valuable ethnobotanical data gets disappeared (Jain, 1991).

Many plant species which are used by indigenous people are also used in Ayurveda and Unani. For example *Saraca indica / Saraca asoca* (Roxb.) wild is used by the tribal people for treating menstrual cramps; some cases of uterine bleeding; uterine fibroids; haemorrhoids, and internal bleeding. Its bark is very popular as herb in Ayurveda, particularly useful for treating the female reproductive system. Similarly *Aegle marmelos*, tribal people use it for treating diarrhoea enteric infections, is also used for diarrhea and dysentery in Ayurveda. *Aegle marmelos* is one of the key ingredient of two "churans" namely- Gangadarchuran and Pushyanugachuran used to cure dysentery and diarrhea (Billore, 1984).

Academic Significance of the Work

Since the beginning of life on earth plants are of immense value. In the earlier times survival of mankind was totally dependent on herbs, shrubs and trees. Moreover, plants are still the source of vital medicines which are used for treatment of a number of ailments, plants products generally have lesser side effects as compared to synthetic or semi synthetic medicines because

the naturally occurring compounds react more slowly and often include their own oxidative products to counter act any toxic effect.

The concept of conservation of biodiversity is inbuilt and interwoven in the traditional and religious belief of the ethnic communities. This is an area of research that presents a variety of opportunities for conservation, sustainable development and health-care.

Although modern technology in the field of medical has accomplished miraculous feats but still plants have their own importance. The importance of ethnobotany has been seriously felt in recent years due to vast plant resources of the country and a number of pharmaceutical uses of plant extracts. Therefore, now a days screening of medicinal herbs as potential sources of new bioactive compounds of therapeutic value has increased.

This work will have a great academic significance as far as the tissue culture studies and medicinal importance of these plants are concerned. The various experiments which were designed during the course of investigation and their subsequent results will provide to understand the physiology of growth and also about the medicinal importance of various secondary metabolites as antioxidants and in the treatment of cancer.

Such efforts are indeed necessary for successful commercial metabolites for medicinal and pharmaceutical purposes, and may open alternative sources of naturals and therefore, positively influence the conservation status of concerned plants in the wild and their properties exploited for the modern medicine system.

Relevance to Needs of Society / Country

The relevance of this kind of work is well known and its need to the society and country as a whole is well understood. The medicinal value of number of plants especially in the rural areas has been realized since hundreds and thousands of years. Such plants species have become endangered and needs to be restored by one or the other way. Tissue culture technique can be proved to be one of the best instruments for establishing a protocol in order to have micro-propagation of such plants. Plant tissue culture has been viewed a key technology for enhancing the capability for production of large quantities of planting material of selected elite high yielding varieties so as to boost production of the active principles and productivity and to conserve the fast diminishing species. Advances in tissue culture combined with improvement in genetic engineering techniques specifically transformation technology have opened new avenues for high volume production of pharmaceuticals, nutraceuticals and other beneficial substances.

A concerted effort in R&D aimed at commercialization of the products and processes utilizing the existing natural resource of the country would provide economic benefit not only to the resource of the commonalties, but would also help the nation to compete in the international market. Use of Biotechnology to convert the biological wealth into economic wealth resulting on a sustainable basis would be our aim as we move into the next century combating with the various deadly diseases like cancer.

Its Likely Contribution to Knowledge

Plants are very rich sources of pharmaceutically potent compounds; but there is a need to synthesize these compounds within laboratory conditions. In vitro culture is an important technology since many secondary plant metabolites can't be synthesised chemically. Many plant species are unexploited and their medicinal properties are unknown; and even the medicinal remedies pass down from generations are being lost. Further research and conservation of all plant species including medicinal plants is needed to preserve nature's natural drugs. Advances in plant tissue culture technology will enable rapid multiplication and sustainable use of medicinal plants for future generations. The effort in this direction will particularly strengthen

the experimental morphogenesis research and teaching programme. Plant tissue culture has emerged as a powerful technique with the potential not only for rapid and clonal mass propagation of plant species required in large numbers in plantation programmes, but also for the production of pharmaceutically important secondary metabolites. It also provides novel approaches for the treatment of various dreaded diseases like Cancer and Diabetes.
Hence advantages in tissue culture have opened several avenues for the bulk production of pharmaceutical and neutraceuticals and various economically important metabolites.

CONCLUSION

India in the present scenario is very rich in biodiversity. The ethnic people have helped in conservation of bio-diversity. However, efforts for conservation in present scenario have to be made in both vertical as well as horizontal direction due to rapid industrial revolution and urbanization. Conservation of diversity, sustainable management, micropropagation of such valued flora is the need of this century

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