

Review on Application and Management of Medicinal Plants for the Livelihood of the Local Community

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Abstract

The beginnings of the medicinal plants' use were instinctive, as is the case with animals. In time, the reasons for the usage of specific medicinal plants for treatment of certain diseases were being discovered; thus, the medicinal plants' usage gradually abandoned the empiric framework and became founded on explicatory facts. Plants have provided man with all his needs in terms of shelter, clothing, food, flavours and fragrances as not the least, medicines. The beneficial medicinal effects of plant materials typically result from the combinations of secondary products present in the plant. Many countries use the plant as medicinal value for primary healthcare. A great amount of traditional knowledge about the use of medicinal plant species is still carried and orally transmitted by indigenous peoples. Currently, approximately 25% of allopathic drugs are derived from plant based compounds, and many others are synthetic analogues built on prototype compounds isolated from plant species. Plants represent a constant interest as sources of novel foods and medicines. Fruit and leaves of different tree species (both wild and cultivated) are essential to alleviate human health problems and food insecurity especially in the developing world. Medicinal plants, since times immemorial, have been used virtually in all cultures as a source of medicine. Medicinal plants are accessible, affordable and culturally appropriate sources of primary health care for more than 80 percent of population. Most of the countries special developing lives in rural area which are considered poor depend on medicinal plants. The medicinal plants play a significant role in providing their own nutrient composition. In addition to these benefits also it has potential of antimicrobial and antioxidant agents. These medicinal plants are faced to challenge as the reason of population increasing, human encroachments and others. Many stalk holders play a great role to conserve and managing the medicinal plants by different approaches.

Keywords: Conservation, Indigenous knowledge, Livelihoods, Medicinal Plants

1. INTRODUCTION

The beginnings of the medicinal plants' use were instinctive, as is the case with animals (Stojanoski, 2006). In view of the fact that at the time there was not sufficient information either concerning the reasons for the illnesses or concerning which plant and how it could be utilized as a cure, everything was based on experience. Plants have provided man with all his needs in terms of shelter, clothing, food, flavours and fragrances as not the least, medicines. Plants have formed the basis of sophisticated Traditional Medicine (TM) systems that have been in existence for thousands of years and continue to provide mankind with new remedies. The ancient cultures are known for their systematic collection of information on herbs and their rich and well-defined herbal pharmacopoeias. Although some of the therapeutic properties attributed to plants have proven to be erroneous, medicinal plant therapy is based on the empirical findings of hundreds and thousands of years (Gurib, 2006).

According to OPS (Arias, 1999) a medicinal plant is (1) any plant used in order to relieve, prevent or cure a disease or to alter physiological and pathological process, or (2) any plant employed as a source of drugs or their precursors. A phytopharmaceutical preparation or herbal medicine is any manufactured medicine obtained exclusively from plants (aerial and non-aerial parts, juices, resins and oil), either in the crude state or as a pharmaceutical formulation (Rates, 2001).

Ethno botanical studies have become increasingly valuable in the development of health care and conservation programs in different parts of the world. The green pharmaceuticals are receiving extraordinary importance and popularity. Ethno botany and ethno pharmacology have contributed to the discovery of many important plant-derived drugs. Soejarto *et al.* (2005) claimed that future mass bio prospecting effort must incorporate important consideration about team scientific expertise (of all relevant disciplines) together with expertise in a wide range of human endeavours, including diplomacy, international laws and legal understandings, social sciences, politics, anthropology and good common sense.

Sustainable use of wild populations of medicinal plants requires robust assessment of the distribution and abundance of target species. While it is increasingly recognized that sustainable harvest of wild populations "is one of the most misunderstood and misused concepts in today's conservation arena" (Struhsaker, 1998), and that sustainable use has no direct connection with the more encompassing concept of 'ecological sustainability' (Hall and Bawa, 1993), in practical terms there are often limited alternative options available to resource managers, especially given the long history of dependence of rural communities on harvesting from natural habitats, whether officially sanctioned or not.

The diversity of life on Earth is dramatically affected by human alterations of ecosystems and the reverse is also true: biodiversity in the broad sense affects the properties of ecosystems and, therefore, the benefits that humans obtain from them (Díaz *et al.*, 2006). In general people who rely most directly on ecosystem services, such as subsistence farmers, the rural poor, and traditional societies, face the most serious and immediate risks from biodiversity loss and this is a general situation that happen with medicinal plants (Mertz *et al.*, 2007). So the objective of this paper is to review the application and management of medicinal plants for the livelihood of the local community.

2. Ecological status of medicinal plants

The forests of India have been the source of traditional medicines for millennia. Of the 17,000 species of higher plants described in India, 7500 are known for their medicinal uses. The Charak Samhita, a document on herbal therapy written about 300 BC, reports on the production of 340 herbal drugs and their indigenous uses. The use of alternative medicine is growing because of its moderate costs and increasing faith in herbal medicine. Allopathic medicine can cure a wide range of diseases, however, its high prices and side-effects are causing many people to return to herbal medicines which tend to have fewer side effects (Kala, 2004).

Rural households in the Mahipal region of semi-arid South-West Madagascar strongly depend on the exploitation of natural resources for their basic needs and income regeneration. An overuse of such resource Madagascar constitutes one of the most important biodiversity hotspots worldwide with more than 90% of its plant and animal species being endemic, however, these resources are severely threatened by ecosystem degradation (Myers *et al.*, 2000).

Currently, approximately 25% of allopathic drugs are derived from plant based compounds, and many others are synthetic analogues built on prototype compounds isolated from plant species (Rao *et al.*, 2004). According to the World Health Organization (WHO, 2005), as many as 80% of the world's people depend on traditional medicine to meet their primary health care needs.

The Himalayan range in the northern part of India harbours a great diversity of medicinal plants. Of the approximately 8000 species of angiosperms, 44 species of gymnosperms and 600 species of pteridophytes that have been reported in the Indian Himalaya (Singh *et al.*, 2005) 1748 species are known for their medicinal properties (Kala, 2004). The state of Uttarakhand is a part of north-western Himalaya, and still maintains a dense vegetation cover (65%). The maximum species of medicinal plants have been reported from Uttarakh (Kala, 2002). The trans-Himalaya in contrast sustains about 337 species of medicinal plants, which are low compared to other areas of the Himalaya due to the distinct geography and ecological marginal conditions (Singh *et al.*, 2005).

Recent years have seen a sudden rise in the demand of herbal products and plant based drugs across the world resulting in the heavy exploitation of medicinal plants. Habitat degradation, unsustainable harvesting and over-exploitation to meet the demands of the mostly illegal trade in medicinal plants have already led to the extinction of more than 150 plant species in the wild (Cunningham, 2000). More than 90% of plant species used in the herbal industries is extracted from the wild, and about 70% of the medicinal plants of Indian Himalaya are subject to destructive harvesting, and the majority of these plants stems from sub-alpine and alpine regions of the Himalaya (Huntingto, 2000).

2.1. Indigenous knowledge and medicinal plants

Plants represent a constant interest as sources of novel foods and medicines. Fruit and leaves of different tree species (both wild and cultivated) are essential to alleviate human health problems and food insecurity especially in the developing world. According to Jeambey *et al.*, (2009) using fruit from trees improves blood circulation, prevents diabetes, and reduces obesity, cancer, and chances of being affected by heart diseases. Medicinal plants form the basis of traditional healthcare systems for the majority of the population of developing nations. About 500 million people in south Asian countries alone are reported to seek health security from plants (Mesfin *et al.*, 2014). Demand has been increasing as a result of growth of human populations and the frequently inadequate provision of modern medicine (Mesfin, 2014).

According to Bekele (2007), the major reasons why medicinal plants are demanded in Ethiopia are due to culturally linked traditions, the trust the communities have in traditional medicine, and relatively low cost in using. Since time immemorial, people have gathered plant and animal resources for their needs. Examples include edible nuts, mushrooms, fruits, herbs, spices, gums, game, fodder and fibres used for construction of shelter and housing, clothing or utensils, and plant or animal products for medicinal, cosmetic or cultural uses. Even today, hundreds of millions of people, mostly in developing countries, derive a significant part of their subsistence needs and income from gathered plant and animal products (Walter, 2001). Gathering of high value products such as mushrooms (morels, matsutake and truffles), medicinal plants (ginseng, black cohosh and goldenseal) also continues in developed countries for cultural and economic reasons (Johns and Ticktin, 2002).

Ethiopia is believed to be home for about 6,500 species of higher plants with approximately 12% endemic, hence making it one of the six plant biodiversity-rich countries of Africa. The greater concentration of

medicinal plants are found in the south and south western Ethiopian parts of the country following the concentration of biological and cultural diversity (Edwards, 2001). The various citations made from various written records of medicinal plants from central, north and north western part of Ethiopia are thus small fractions of medicinal plants in Ethiopia.

The issue of medicinal plant conservation in Ethiopia today calls for aggressive studies and documentation before the accelerated ecological and cultural transformation distort the physical entities and the associated knowledge base. Derogatory attitudes towards traditional medicine practitioners had forced healers to keep their knowledge and practices to themselves. Moreover, the indigenous knowledge associated with the conservation and use of medicinal plants is also disappearing at an alarming rate (Endashaw, 2007).

2.2. Livelihoods of the Community and Medicinal Plants

Medicinal plants, since times immemorial, have been used virtually in all cultures as a source of medicine. All known civilizations of the past, be it, Egyptian, Babylonian, Jewish, Chinese, Indus-valley etc., had their own glorious and useful systems of medicine and health care (Briskin, 2000). As any other civilization on earth, Indian civilization has also taken the blessing from the medicinal and aromatic plants to secure the health from the ancient times.

2.2.1. Medicinal Plants and Human Health

Medicinal plants are accessible, affordable and culturally appropriate sources of primary health care for more than 80 percent of Asia's population (WHO, 2005). Marginalized people, who cannot afford or access formal health care systems, are especially dependent on these culturally familiar, technically simple, financially affordable and generally effective traditional medicines. Several nations in South and East Asia, traditional systems of medicine use thousands of plant species to treat malaria, stomach ulcers, and various other disorders. Throughout the region, there is strong and sustained public support for the protection and promotion of the cultural and spiritual values of traditional medicines (Natesh, 2000).

Furthermore, (WHO, 2013) estimated that 80 per cent of the population of developing countries rely on traditional medicine mostly plant drugs, for their primary health care needs as they are natural, safe, non-narcotic, having no side effects, moreover, cost effective, preventive and curative therapies and has recommended that traditional knowledge systems should be intervened with any other intervention to achieve the goal of "Health for all" in a cost effective manner. With the scarcity of doctors and paucity of hospitals and clinics, the large majorities of these populations have to rely on sources other than allopathic medicine for their health care.

Traditional System of Medicine UNSECO (1996) has observed that the use of traditional medicine and medicinal plants in most developing countries, are normative basis for the maintenance of good health. The World Health Organization (WHO, 2005) has defined herbal medicines as "finished labelled medicinal products that contain ingredients from aerial or underground parts of plant parts or other plant material or combination, whether in the crude state or as plant preparations.

Modern pharmacopoeia contains at least 25 percent drugs derived from plants and many other which are synthetic analogues are based on prototype compounds isolated from plants. India and China are the two major producing countries, having 40 per cent of the global biodiversity and availability of rare species (Chatterjee, 2002). These are well known as the home of medicinal and aromatic crops that constitute a segment of the flora, and provide raw materials to the pharmaceutical, cosmetic, fragrance, flavour industries. Various reports from the United Nations have indicated that 33 per cent of drug products in the highly industrialized countries are derived directly from higher plants (Mehrotra, 2005).

2.2.2. Socio-Economic Benefits

With a gross national income (GNI) per capita of \$828 (Gender and Human Rights; 2008), Madagascar ranks 151 out of 187 countries on the Human Development Index (HDI). Altogether, 74% of the population lives in rural areas of which 78% are considered poor (UNDP, 2013) and mostly depend on the direct exploitation of natural resources (fields, water, forests) for their livelihoods.

Medicinal plants are also inextricably linked to the region's natural rich biodiversity as some of the richest pockets of MAP biodiversity are found in the two global 'hotspots' of eastern Himalayas and Western Ghats of Indian subcontinent. Due various factors such as environmental, socio-economic and institutional problems, biodiversity in these areas is threatened. A study by Tiwari (2002) indicated that from the Khasi region Meghalaya alone, about 2800 tons of *Cinamomom tamala* worth 0.75 million USD are sold annually by the local communities. On the other hand, traditional and indigenous knowledge and practices about these plants are weakening in public domain and, in many cases, vanishing all together. Medicinal plants as a group comprise approximately 8000 species and account for around 50% of all the higher flowering plant species of India (Chatterjee, 2002).

Millions of rural households use medicinal plants in a self-help mode. Over one and a half million practitioners of the Indian System of Medicine in the oral and codified streams use medicinal plants in preventive, primitive and curative applications. There are estimated to be over 7800 manufacturing units in India.

In recent years, the growing demand for herbal product has led to a quantum jump in volume of plant materials traded within and across the countries. An estimate of the EXIM Bank puts the international market of medicinal plants related trade at US\$ 60 billion per year growing at the rate of 7% only (Lenin, 2010). India has a rich biodiversity the growing demand is putting a heavy strain on the existing resources. While the demand for medicinal plants is growing, some of them are increasingly being threatened in their natural habitat. For meeting the future needs cultivation of medicinal plant has to be encouraged. According to an all India ethno biological survey carried out by the Ministry of Environment & Forests, Government of India, there are over 8000 species of plants being used by the people of India (Archana *et al.*, 2011).

Most of African populations use some form of traditional herbal medicine and the worldwide annual market for these products approaches US\$ 60 billion. Many hope traditional herbal medicine research will play a critical role in global health. China, India, Nigeria, the United States of America (USA) and WHO have all made substantial research investments in traditional herbal medicines. Industry has also invested millions of US dollars looking for promising medicinal herbs and novel chemical compounds. This is still a relatively modest investment compared to the overall pharmaceutical industry; however, it raises interesting ethical questions, some of which are not faced in more conventional drug development (Adnan *et al.*, 2010).

2.2.3. Nutritional Benefits

Medicinal plants play a significant role in providing primary health care services to rural people and are used by about 80% of the marginal communities around the world. Each medicinal plant species has its own nutrient composition besides having pharmacologically important photochemical. These nutrients are essential for the physiological functions of human body. Such nutrients and biochemicals like carbohydrates, fats and proteins play an important role in satisfying human needs for energy and life processes (Adnan *et al.*, 2010).

The genus *Hibiscus* (family *Malvaceae*) includes more than 300 species of annual or perennial herbs or shrubs and commonly known as Roselle or red sorrel. Among them *Hibiscus sabdariffa L.*, which has many medicinal uses (Alarcon *et al.*, 2007). This plant is native to West Africa and widely grown in the Brahmaputra Valley region of the North Eastern part of India. This plant is widely used in traditional medicines in India, Africa and Mexico. Infusions of the leaves or calyces are traditionally used for their diuretic, choleric, febrifugal and hypotensive effects, decreasing the viscosity of the blood and stimulating intestinal peristalsis, recommended as a hypotensive it may be avoid. It is also useful in the treatment for cardiac, nerve diseases, cancer and liver toxicity. Besides its importance as a food or traditional medicine in the countries of its geographic origin, it is used worldwide as an important ingredient in industrially produced teas and beverages (Plotto, 2004). Young leaves and stems are eaten raw or cooked in salads and as a seasoning in curries. Fresh calyx (the outer whorl of the flower) is eaten raw in salads, or cooked and used as a flavouring in cakes and is also used in making jellies, soups, sauces, pickles, puddings, etc. (Lepengue *et al.*, 2009).

The human body has a complex system of natural enzymatic and non-enzymatic antioxidant defences, which counteract the harmful effects of free radicals and other oxidants. Protection against free radicals can be enhanced by simply intakes of dietary antioxidants. It has been reported that the antioxidant activity of plant materials are well correlated with the content of their phenol compounds (Debaleena *et al.*, 2015). Phenol compounds, especially phenol acids and flavonoids, are ubiquitously present in vegetables, fruits, seeds, tea, wines and juices; thus, they are an integral part of the human diet. They have played an important role in the health care industry. To provide support to our body defense mechanism, our diet must contain sufficient amount of nutrients and antioxidants. Incorporation of antioxidant rich foods in our daily diet will be boosted our immune system and it is safer and cheaper than commercially available antioxidants. Hibiscus is considered as a great source of natural antioxidants (Lopez *et al.*, 2007).

2.3. Antimicrobial and Antioxidant Agents in Food Industry

2.3.1. Antioxidant Agents in Food Industry

The search of new safe substances for food preservation is being performed around the world (Magnuson *et al.*, 2013). Synthetic food additives are passing a difficult season in addition to the great deal of time and money that is required to develop and approve new synthetic preservatives, especially in view of the public pressure against them. The excessive use of synthetic preservatives, some of which are suspected because of their toxicity, increased pressure on food manufacturers to either completely remove these agents or to adopt natural alternatives for the maintenance or extension of a product's shelf life (Kotuwegedara and Seneviratne, 2009). Such obstacles provide new opportunities for those seeking natural alternatives for new food preservatives.

Many plant occurring bioactive compounds can be considered as good alternatives to synthetic antimicrobial and antioxidant food additives Silva-Espinoza and others 2013 cited in Alberto *et al.*, 2014). These compounds are mostly derived from plants and their antimicrobial and antioxidant in vitro testing have resulted in many publications in the last decade. The antimicrobial and antioxidant properties of bioactive compounds are mainly due to their redox properties, ability to chelate metals, and quenching reactive species of singlet oxygen (Krishnaiah and others 2011 cited in Alberto *et al.*, 2014). However, the selection of the plant sources to extract

these compounds must be guided for the safe use of food additives. Medicinal plant parts (roots, leaves, branches/stems, barks, flowers, and fruits) are commonly rich in terpenes (carvacrol, citral, linalool, and geraniol) and phenolics (flavonoids and phenol acids), and these compounds have been effective as food additives. For example, lemongrass is a medicinal plant utilized as stomachic, antispasmodic, carminative, and antihypertensive agent. In addition, it is a source of terpenes like citral that has shown antimicrobial activity against food pathogen and deteriorative bacteria, and antioxidant effect avoiding lipid per oxidation in food matrices (Magnuson *et al.*, 2013).

2.3.2. Antimicrobial Agents

Other medicinal plants that could be used to sustain the idea of generating extracts with potential as antimicrobial agents are: *Chenopodium ambrosioides* rich in terpenes (used to control menses disorders, fibroids, uterine hemorrhage, and parasitic diseases); *Euphorbia stenoclada* rich in phenolics (used to control skin diseases, gonorrhoea, migraine, intestinal parasites and wart cures); *Geranium mexicanum* rich in terpenes and phenolics (used as remedy against tonsillitis, cough, whooping cough, urticaria, dysentery and diarrhea); *Gnaphalium oxyphyllum* rich in phenolics (used to treat gripe, fever, asthma, bronchitis, and cough); *Helianthemum glomeratum* rich in flavonoids (used to treat bloody and mucoid diarrheas and for the relief of abdominal pain); *Larrea tridentata* rich in phenol compounds (used to treat respiratory infections as tuberculosis); *Marrubium vulgare* rich in terpenes and phenolics (used mainly as an expectorant); *Peumus boldus* rich in phenolics and alkaloids (regulator of the hepatic function, colagogue, antispasmodic, digestive stimulant, and nervous sedative); *Eysenhardtia polystachya* rich in flavonoids (used to treat kidney and bladder infections, diuretic, antispasmodic and febrifuge) (Ekaluo *et al.*, 2015).

2.4. Conservation and Management of Medicinal Plants

Over the past three decades, the global environmental crisis has led to a belated acknowledgment that man is part of nature, a new paradigm challenging biological and ecological research, which has, in the past, tended to consider natural objects as totally independent of any social or political sphere (Lama *et al.*, 2001).

The importance of ethno biological knowledge (we consider here ethno botany and ethno ecology as different subjects of the overall discipline known as ethno biology) for suggesting new paths in scientific research, for conservation monitoring, or for understanding ecological processes, has received much attention in resource management (Folke and Olsson, 2001).

International agencies such as the World Wildlife Fund (WWF) and UNESCO, in the context of their joint program, the People and Plants initiative, have also promoted research on ethno botanical knowledge, as well as integration of people's perceptions and practices in resource management at the local level (Cunningham, 2000). Incorporation into biological and ecological studies of local-use patterns and of the social and institutional background that guides the relationships between people and nature, has led to a greater understanding of the relationship between social and ecological dynamics.

The dialectical relationship between ethno biological knowledge and local practices shapes the ecosystem and affects its constituent plant populations. In the context of community-based projects, global perceptions of biodiversity conservation and scientific understanding of ecosystem dynamics are confronted with local communities' knowledge of, perceptions of, and values associated with the different components of the ecosystem. Local knowledge and practices have to be analyzed and understood so that appropriate management practices that build on both scientific and local knowledge may be developed (Johns and Ticktin, 2002).

Recent studies also show that local knowledge and practices have certain similarities to complex adaptive systems, having the capacity to deal with uncertainty and to respond to ecosystem change. By incorporating local knowledge and practices in the process of scientific research, new hypotheses can be developed for research experiments relevant to management. Knowledge variation across and within cultural groups has not been given much attention, nor has knowledge variation been clearly related to the goals and behavior of the knowledge holders (Kayombo *et al.*, 2013).

2.5. Challenges of Medicinal Plants

The modern medicine is well developed in most of the world, large sections of the population in developing countries especially in rural areas where more than 80% of the population live still rely on Traditional Medicine (TRM) for Primary Care (PHC) (WHO, 1995).

Medicinal plants constitute 95% of the total components of TRM (WHO, 2005). The major reasons for use of TRM and its practitioners for healthcare needs in these countries are inadequacy of health facilities, medical personnel, drugs and other medical supplies. Most of the useful herbal plants are collected from the wild. TRM and its practitioners are interwoven in the community's culture with its beliefs and taboo (Kayombo *et al.*, 2006).

Current trend of Population growth has led to encroachment of forests including sacred forests that were cultural prohibited and were areas where medicinal plants were found. Sacred forests are also used for

matambiko (traditional sacrifice). Not only that but also there are increasing number of companies in mining, road and railway construction, large or estate farming being introduced in many developing countries. These human socioeconomic activities have impact on medicinal plants, the main resource base of TRM (UNEP, 2006). Besides the above, it is being witnessed that in Africa, there is a high rate of deforestation and loss of biodiversity through bush fires, lumbering, bio prospectors on medicinal and aromatic plants. For example, a recent study by FAO shows that from 1980 to 1990 the world's tropical forests were reduced by an average of 15.4 million hectares (8% annual rate of deforestation). In Africa the rate of deforestation exceeds the global annual rate of reforestation. In Tanzania, depletion rate is estimated to be at 300,000 to 400,000 hectares per year (Agyei, 2010).

3. Summary and Conclusion

Ancient time people used the plants as the source of medicine for treatment of the disease as long as the age of human evolution. Human uses the medicinal plants for primary healthcare. These great amounts of traditional knowledge about the use of medicinal plants through orally transmission by indigenous people. In Ethiopia, there is long history of using medicinal plants to treat a variety of diseases. Human being uses the medicinal plants due to moderate costs and widely curable. Many drugs are obtained (produced) from plants and primary purpose for health care. People use the plant products not only for medicine but also use as source of food, for oxidative agents, antimicrobial and for income generation.

The indigenous knowledge is very important for the conservation and management of the medicinal plants. Unwise use of the natural resource is lead to difficulty face for the world. Now a day plants are at an alarm rate of disappearing special by the human activity. Therefore conserving the plants very important for our planets and these created by awareness the community based conservation approach is equitable.

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