SCREENING GLOBAL CHALLENGES AND PROSPECTS FACING MEDICINAL AND AROMATIC PLANTS

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Abstract

This review summarizes the difficulties and problems facing MAPs as well as recommendations of overcoming challenge, and brings together the main issues relating to this very important subject. The issues must be addressed in order to ensure the conservation and sustainable use of the medicinal plants resource. Interest in medicinal and aromatic plants (MAPs) as a re-emerging health aid has been fuelled by the rising costs of prescription drugs in the maintenance of personal health and well-being, and the bioprospecting of new plant-derived drugs. Vacuum is likely to occur in the supply of raw plant materials that are being over-exploited by the pharmaceutical industry as well as the traditional practitioners. Besides, the major challenges for sustainable wild collection include: lack of knowledge about sustainable harvest rates and practices, undefined land use rights and lack of legislative and policy guidance. In situ conservation of these resources, however, alone cannot meet the ever increasing demand of pharmaceutical industry. Many signs reveal that MAPs are gradually facing extinction. They are: (i) People walk long distances to collect them. (ii) Some crpos are no longer found. (iii) What used to be a thick forest of diverse plant species is reduced to bush and areas that have floral fast disappearing. (iv) Many MAPs are not maturing and seeding because the young plants are being harvested before they mature. Hence, It is necessary to initiate systematic cultivation of medicinal plants in order to conserve biodiversity and protect endangered species. Efforts are also required to suggest appropriate cropping patterns for the incorporation of these plants into the conventional agricultural and forestry cropping systems. In order to initiate systematic cultivation of MAPs high yielding varieties have to be selected. It is therefore necessary to collect, conserve and evaluate germplasm and to

develop agro technologies for wild crops with potential for farming. Sometimes high yielding varieties have also to be developed by selective breeding or clonal micro-propagation. The selected propagation materials have to be distributed to the cultivators either through nurseries or seed banks. Identifying the conservation benefits and costs of the different production systems for MAPs should help guide policies as to whether species conservation should take place in nature or the nursery, or both.

Key words: medicinal and aromatic plants, pharmaceutical, wild grown MAPs protection.

The values of MAPs

Since time immemorial, people have gathered plant and animal resources for their needs. Examples include edible nuts, mushrooms, fruits, herbs, spices, gums, game, fodder, 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 [1,2]. It is likely that the profound knowledge of herbal remedies in traditional cultures developed through trial and error over many centuries, and that the most important cures were carefully passed on verbally from one generation to another. The history of pharmacy was for centuries identical with the history of pharmacognosy, or the study of materia medica, which were obtained from natural sources—mostly plants but minerals, animals, and fungi [3].

The World Health Organization estimated that 80% of the populations of developing countries rely on traditional medicines, mostly plant drugs, for their primary health care needs [4]. Also, modern pharmacopoeia still contains at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. Interest in medicinal plants as a re-emerging health aid has been fuelled by the rising costs of prescription drugs in the maintenance of personal health and well being and the bioprospecting of new plant-derived drugs [5]. The medicinal properties of plants could be based on the antioxidant, antimicrobial antipyretic effects of the phytochemicals in them [6,7].

Global use and marketing of MAPs

In terms of the number of species individually targeted, the use of plants as medicines represents by far the biggest human use of the natural world. Plants provide the predominant ingredients of medicines in most medical traditions. There is no reliable figure for the total number of medicinal plants on Earth, and numbers and percentages for countries and regions vary greatly [8]. Estimates for the numbers of species used medicinally include: 35 000– 70 000 or 53 000 worldwide [9, 10]. 10 000–11 250 in China [11]; 7500 in India [12] and 2572 traditionally by North American Indians [13]. The great majority of species of medicinal plants are used only in Folk Medicine. Traditional Scholarly Medical Systems employ relatively few: 500–600 commonly in Traditional Chinese Medicine (but 6000 overall) [14]; 1430 in Mongolian Medicine [11]; 1106–3600 in Tibetan Medicine [11, 14]; 1250–1400 in Ayurveda [15]; 342 in Unani; and 328 in Siddha [12]. The number of plant species that provide ingredients for drugs used in Western Medicine is even fewer. It was calculated for an article published in 1991 that there were 121 drugs in current use in the USA derived from plants, with 95 species acting as sources (more than one drug is obtained from some species) [9]. Despite the small number of source species, drugs derived from plants are of immense importance in terms of numbers of patients treated. It is reported that ca. 25% of all prescriptions dispensed from community pharmacies in the USA between 1959 and 1973 contained one or more ingredients derived from higher plants [9]. Currently, most of these herbs are grown in large quantities and marketed by France, U.K. Canada, Turkey and U.S.A. It is estimated that Indian consumption alone of these herbs is approximately 200 tons per annum, and only about 60 tones are produced indigenously. Bulk of these herbs (188 tones) is used for culinary purposes and about 12 tones are consumed for medicinal and cosmetic preparations. The largest global markets for medicinal plants are China, France, Germany, Italy, Japan, Spain, UK and US. Japan has the highest per capital consumption of botanical medicines in the world [16].

Challenges surrounding medicinal plants

Concerns about loss of biological diversity and the availability of resources

There is no reliable estimate for the number of medicinal plants that are globally threatened, variously calculated as 4160 or 10 000 [17,10]. There would seem little doubt from theoretical considerations [18] that many medicinal plant species that have been listed as threatened, and indeed others that have not, must be suffering from genetic erosion now, or will do so in the near future. This is because populations of many species are in retreat, with outlying populations being destroyed, as the extent and quality of many natural habitats decline [19].

Concerns about declines in local knowledge and cultural survival

Knowledge of medicinal plants, as once embedded in tens of thousands of indigenous cultures, is rapidly disappearing. Every year, the sum total of human knowledge about the types, distribution, ecology, methods of management and methods of extracting the useful properties of medicinal plants is declining rapidly – a continuation of a process of loss of local cultural diversity that has been underway for hundreds of years. There has, of course, been a great growth in scientific information about medicinal plants in recent decades, but in many ways this has proved poor compensation, because such information is often inaccessible at field level or is irrelevant to the problems faced by land managers, or collectors or growers of medicinal plants [19].

Concerns relating to the availability and quality of healthcare services

There is also the question of how best to develop traditional systems to meet modern challenges. The environment in which traditional medical practitioners are operating today is not the same as in the past [20]. Sensitive techniques are needed to avoid unnecessary prohibitions. Due attention needs to be given to traditional standards of quality, which, in Ayurveda, for example, classically refer to cultural and tantric use as well as therapeutic qualities [21].

Concerns relating to the terms of research on medicinal plants

Some of the concerns have arisen because of knowledge, or suspicion, that some scientists, research institutes or commercial enterprises have taken samples of plants to test for new products, such as pharmaceutical drugs, without due permission or on ethically unacceptable terms [22].

A case study

Pratap Desai [16] summarized the cultivation problems of MAPs in Western Maharashtra, India as follows:

1. Cultivation of MAP: Most of the cultivators are not aware about the Agronomy of MAP. Cultivators are new to medicinal plants as they are familiar with cultivation of few traditional crops like jawar, tobacco, sugarcane. The agronomy of the medicinal plants differs from traditional plants. Moreover, cultivators who are aware about the agronomy of medicinal plants are less in percentage.

2. Prevalence of insects and diseases: The prevalence of insects in the fields is less, where as when the crop is harvested and stored, the prevalence is more.

3. Climate variation: Most farmers faced the problem of climate variation, as it's a natural phenomenon.

4. Not availability of skilled labor: Many of farmers do not get skilled labors. A medicinal plant is a new concept for the cultivators and it's difficult to get skilled labor, as labor is not aware about the medicinal plants agronomy in details.

5. Physical Infrastructure: For development of any organization, the physical infrastructure plays a major role. In case of MAP the important infrastructure are the transport facility, storage facility, the processing facilities and the markets for medicinal and aromatic plants. Only few cultivators have the facility of processing, primary processing like drying and sorting is done by many farmers and processing like distillation is done by very few cultivators.

6. Market quality standards of product: farmers are facing the problem to match the quality standards of the product in the Market as per the demand in market as they don't get training of proper agronomy of MAP and marketing.

7. Inadequate market demand information: the cultivators do not get the adequate information about the requirement of MAP in market. As all the schemes and information do not reach to the cultivators.

8. Unorganized market system: the market system is highly unorganized, there is no fixed pattern of marketing; the rates and the demand for MAP always fluctuate.

9. Distribution channel has turned out Middlemen: cultivators are cheated by the middlemen as the rate of MAP is decided by him, and the rate always fluctuates.

10. Long distance to Market place: the market places are far away from the farms of MAP cultivator, and they are not able to bear the transportation charges. And other transport facilities are not available as farms are in the remote areas.

Aspects of medicinal plant conservation

The special significance of medicinal plants in conservation stems from the major cultural, livelihood or economic roles that they play in many people's lives. Various sets of recommendations have been compiled relating to the conservation of medicinal plants including the need for co-ordinated conservation action, based on both in situ and ex situ strategies; inclusion of community and gender perspectives in the development of policies and programmes;the need for more information on the medicinal plant trade; the establishment of systems for inventorying and monitoring the status of medicinal plants; the development of sustainable harvesting practices; encouragement for microenterprise development by indigenous and rural communities; and the protection of traditional resource and intellectual property rights [23].

Need for implementation of management plans

Limiting the harvest to a sustainable level requires an effective management system and sound scientific information. The management system must include annual harvest quotas, consider seasonal or geographical restrictions and restriction of harvest to particular plant parts or size classes. In addition, clarification of the access and user rights to the resources providing MAP is part of the essential baseline information.

Continuous monitoring and evaluation of the success is necessary to adapt the management strategy [24].

Eco-labelling and certification

Given that sustainable harvesting from the wild is difficult to achieve, certification standards can play a role to assure that a product meets certain standards of sustainability. Certification programmes related to natural-resource use have mainly been developed for timber and agricultural products, but they are presently being adapted for wild-harvest of non-timber plants. Various schemes focus on different areas along the supply chain: production, processing, trade, manufacturing and marketing. Four categories of certification schemes have been identified to be of relevance for MAP products [25]: (i) forest management certification; (ii) social certification; (iii) organic certification; and (iv) product quality certification.

***Ex situ* conservation, propagation, domestication and the breeding of crop varieties**

Plant species can be found away from the sites where they naturally occur in a range of contexts, including in botanic and other types of gardens, nurseries, seedbanks, tissue culture units, etc. [19]. As an example of how ex situ collections of MAPs can be connected to conservation and livelihoods through circa situ means, consider the case of the Pepperbark tree (Warburgia salutaris), the most highly prized medicinal plant in southern Africa. This species has been collected to the point of national extinction in Zimbabwe, causing difficulties in obtaining the medicine[26].

Efforts to new product discovery

Several stages are involved in the process of prospecting the chemical properties of plants to discover drugs or other novel products. This subject is covered authoritatively in some recent publications [27].

Conclusion

The special significance of medicinal plants in conservation relates to the values that they hold for people. These values concern the contributions that medicinal plants can make to healthcare, financial income, cultural identity and livelihood security. It is believed that these contributions can sometimes be sufficiently great that a focus on medicinal plants has the potential to achieve much more, in terms of conservation and sustainable development, than just conservation of populations of the medicinal plants themselves, or sustainable production of materials for medicines (though these, in themselves, are admirable objectives). It would be useful to investigate the geographical relationship between the overall value of medicinal plants to people (if this could be measured) and the distribution of plant diversity. It is suspected that medicinal plants often achieve their highest relative values in societies found in places richest in plant diversity. If this association is found to hold, then projects at many centres of plant diversity aimed at general biological conservation could often usefully have a focus on medicinal plants.

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