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Potential of medicinal plants in Kashmir Himalayas: A review

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Abstract

The Himalayas are recognized as one of the important global biodiversity hotspots where ecological, phyto-geographical and evolutionary factors favors high species diversity. It has a large altitudinal range (300- 800m amsl) and supports a unique flora and fauna. About 18,440 species of plants (25.3% species endemic), 1748 species of medicinal plants and 675 species of wild edibles. Medicinal plants are traded as both as raw material and as processed final products. The collection and more recently marketing of medicinal plants has provided an important source of income for communities living in the Himalayan region, particularly in Kashmir valley. Medicinal plants have been used for centuries in traditional health care systems and numerous cultures around the world still rely on plants for their basic health care. With the recent advancements in plant sciences, there has been a tremendous increase in the use of plant based health products in developing as well as developed countries. About 70-80% people around the world depend on medicinal plants for basic health care. Medicinal plants are also a source of income for thousands of families in Kashmir valley.

Keywords: Genetic combining ability, specific combining ability, okra, variance, growth

Introduction

The Himalaya has always been a perennial source of attraction, curiosity and challenge to human intellect. The vegetation provides an everlasting field of investigation amongst several other assets. The diversity, copiousness as well as uniqueness of the plant components in various habitats retained sound and aesthetic environment of the Himalaya. However in the recent past couple of years excessive exploitation of vegetations, unplanned land use, natural disastrous and several developmental processes, accelerated deterioration of biodiversity and harmonious ecosystem of the Himalaya (Pant, 2011) [6]. Kashmir Himalayas, one of the most beautiful parts of the Indian Himalayan Region harbors a large number of medicinal plants (Khan and Kumar, 2012) [3]. The state of Jammu and Kashmir is bestowed with a diverse array of natural vegetation in the temperate, alpine and sub- alpine region. The alpine meadows locally called margas are used to be nature's home garden where a multitude of colorful herbs, a variety of medicinal plants and nutritious grass grows in great profusion, besides forming the crucial head waters of the Himalayan rivers and habitat for high altitude fauna, margas are closely linked with the local livelihoods and religious sentiments (Khan, *et al*, 2004) [4].

The alpine zone represents one of the most fascinating biomes in the Himalaya. It forms nearly 33% of the geographical area in the region of which about 25.88% area is vegetated and remaining 7.12% falls under perpetual snow. The alpine vegetation comprises closely matted dwarf shrubs, herbaceous meadows, bogs and snow swept grounds characterized by cushion shaped plants.

India is home to a great variety of medicinally important plant species, and is ranked sixth among 12 mega-diversity countries of the world. Medicinal plants as a group comprise approximately 8000 species and account for around 50% of all higher flowering plant species of India. The Himalayas is recognized as one of the global biodiversity hotspots, where ecological, phytogeographical and evolutionary factors favor high species diversity. A biogeographically unique region, it has the highest degree of species endemism in the Asian region it supports about 18,440 species of plants, of which 25.3% are endemic to the region, a high proportion of which are of use for medicinal purposes. Medicinal plants are traded both as raw materials and as processed final products. Demand for a wide variety of species is increasing as these markets expand and new end-uses are developed. The price trends of most of the Himalayan species of medicinal plants traded in market have been upwards in the last 3 years. However, about 90% of medicinal plants used by the industries are collected from the wild. While over 800 species are used in the industry, less than 50 species of plants

are under commercial cultivation. The increase in demand increases the threat of depletion, and there are currently seventeen Himalayan medicinal plant species listed in the Indian government Red Data Book of Indian Plants). The collection and, more recently, marketing of these plants has provided an important source of income for communities living in hilly areas. The Himalayan region is diverse also in traditions of medical practice. (Apart from the Ayurvedic (Indian) tradition, the Unani (Islamic) and Sowa-rigpa (Tibetan) systems of medicine, as well as diverse folk traditions, are practised in the region. The international market for medicinal plants is dominated by China, Japan and the USA.

Medicinal plant diversity

The Kashmir valley often referred to as heaven on earth is well-known around the globe. One of the main features contributing to the worldwide reputation of Kashmir is the rich biodiversity. Being phyto geographically located at the intersection of Holarctic and Paleotropical Floristic Realms and falling within the North-Western Himalaya, the region is endowed with teeming diversity of medicinal plants [Dar and Khuroo, 2013] [2]. The most commonly used plants were *Taraxacum officinale*, *Artemesia absinthium*, *Berginia ciliata*, *Rheum emodi*, *Saussurea costus*, *Podophyllum hexandrum*, *Achillea millifolium* and *Dioscorea deltoidea*. The more abundant a plant is, the more likely it is to be used.

List of potentially important Medicinal plants used in Kashmir Valley

S. No.	Scientific Name	Local Name	Family	Parts Used	Local uses
1	<i>Saussurea costus</i>	Kuth	Asteraceae	Rhizome	Joint pain, ulcers, fever
2	<i>Podophyllum hexandrum</i>	Wan wangun	Berberidaceae	Roots	Skin diseases, gastric problems
3	<i>Acorus calamus</i>	Via	Acoraceae	Rhizome	Diarrhea, joint pain
4	<i>Artemesia absinthium</i>	Tethwan	Asteraceae	Leaves	Antihelmenthic, Liver infection
5	<i>Taraxacum officinale</i>	Hand	Asteraceae	Whole plant	Back pain, chest infection, common cold
6	<i>Rheum emodi</i>	Pambchalan	Polygonaceae	Roots	Rhematic pain, boils, wounds
7	<i>Berginia ciliata</i>	Pather Phad	Saxifraceae	Rhizome	Stomach ulcers, Urinary problems
8	<i>Arnebia benthamii</i>	Gowzaban	Boraginaceae	Rhizome	Common cold, fever, cough
9	<i>Achillea millifolium</i>	Pahal gasse	Asteraceae	Leaves	Headache, tooth ache, cold
10	<i>Dioscorea deltoidea</i>	Kreath	Dioscoreaceae	Leaf	Urinary infections

Families with the largest number of medicinal plants in Kashmir valley, India

S. No.	Family	Number of Species
1	Asteraceae	11
2	Ranunculaceae	05
3	Lamiaceae	04
4	Pinaceae	04
5	Solanaceae	03

Collection of medicinal herbs

Generally, the villagers acquire knowledge about the use of various herbs from their elders and collect them fresh from their gardens or nearby forests, whenever they need them. However, with deforestation and commercialization of agriculture, many medicinal herbs are not easily available. Furthermore, with the development of allopathic systems, doctors discourage their patients from using herbal medicines. Hence, most of the Ayurvedic medicines produced by the pharmaceutical firms are used as backup remedies, tonics or

to counteract the side effects of allopathic medicines, resulting in loss of faith in the system. Presently, a large number of firms are involved in bulk production of herbal medicines in India. As most of these firms do not have their own source of raw materials required for processing, they are dependent on the natural forests. These firms have been engaging the local people to collect raw material from the forests. The estimated value of herbs extracted for drug production is over US\$ 300 million. The raw material for most of these products comes from the natural forests for which the industry barely pays the cost of labour. This has resulted in the destruction of a large number of herbal species leading to their extinction. Presently, very few species have been exploited for commercial production in Kashmir valley. Among them, *Saussurea costus* is the most important, *Podophyllum hexandrum* is another medicinal plant collected from wild, *Dioscorea deltoidea* is also important climber mostly found in pine forests. Out of this, about 82-85% of the collected material is exported.

Demand of medicinal herbs and their availability

High demand/ High supply, Equal demand supply relation	High demand/ Low supply; demand greater than supply	Low demand/ High supply, Demand lower than supply	Low demand/ Low supply, Equal Demand supply relation
<i>Usnea longissima</i>	<i>Aconitum Heterophyllum</i>	<i>Hippophae Rhamnoides</i>	<i>Berberis aristata</i>
<i>Allium carolinianum</i>	<i>Taxus baccata</i>	<i>Heracleum candicans</i>	<i>Urtica dioica</i>
<i>Betula utilis</i>	<i>Podophyllum hexandrum</i>	<i>Rheum emodi</i>	
<i>Cedrus deodara</i>	<i>Saussurea costus</i>	<i>Pinus roxburghii</i>	
<i>Valeriana jatamansi</i>	<i>Picrorhiza kurroo</i>	<i>Selenium vaginatum</i>	

Conservation and management of medicinal plants in Kashmir

Conservation and management of traditional medicinal plants is an essential concern worldwide, especially in developing countries. The ever-escalating demand for the medicinal plants in pharmaceutical industries and in traditional system has resulted in overexploitation leading to the reduction of their natural populations. Besides, habitat loss due to anthropogenic activities has further intensified the concern. If

overexploitation of these plants continues, many species may decrease in, and ultimately disappear from their natural habitats [Akhtar, 2013] [1]. Although, a number of studies have been carried out to study the diversity and distribution pattern of the medicinal plants in various Himalayan states of India, information on this aspect is not available in Jammu and Kashmir except for few fragmentary information like CAMP (Conservation Assessment and management Prioritization) workshop [Samant, *et al.*, 1998] [7]. Therefore, it is

compulsory to study the diversity, distribution and utilization pattern of the medicinal plants, document folklore uses, identify nativity and endemism and suggest suitable conservation and management strategies. A concerted work plan, involving various stakeholders i.e., scientists, government organizations, NGOs and farmers, is required to implement the rule of section 8 of Biodiversity Act 2002, i.e., conservation of biological diversity, sustainable use of its components and fair and equitable sharing of benefits arising out of the use of biological resources and knowledge to meet out the market demands and conservation of threatened and economically important plant biodiversity of the J&K State. Plants should only be collected in such a manner that ensures their continued presence, both in specific collection locations and across the landscape. The most serious threats to medicinal plants of Kashmir are habitat loss and fragmentation, climate change, and invasive species [Mir, 2013]. Special care has to be given when attributing a legal protection status to a species. Keeping in view the depletion of the medicinal resources, various government and non-government organizations are involved in conservation of these species in Himalayan region in general and particular. In Jammu and Kashmir, various organizations such as Indian Institute of Integrative Medicine, Jammu (formerly known as RRL, Jammu), Centre for Biodiversity Studies, BGSB University, Rajouri, University of Kashmir, Srinagar, Sher-a-Kashmir Agriculture University of Science and Technology, Jammu and Srinagar, State forest Research Institute, J&K, Defence Institute of High Altitude Research, Leh and Shree Mata Vaishno Devi University, University of Jammu, Jammu are keenly involved in developing conservation technologies for medicinal plants of the state. The In-situ conservation of biological resources has been attempted all over India both by the central and state governments. Presently, there are 4 National Parks and 15 Wildlife Sanctuaries for the in-situ conservation of biological diversity [Singh, 2002]^[8]. Besides this one Biosphere reserve has also been proposed recently. These areas cover different altitudinal zones ranging from tropical to alpine and are helping largely in the in-situ conservation of threatened and economically important medicinal plants of the state. However, fragmentary information is available on the diversity, geographical distribution, utilization pattern, and folklore information of threatened medicinal plants in the state. Thus, there is a pressing need to identify the areas (protected and unprotected) and report rich areas as Economically Important Plant Conservation Zones (EIPAZs) at different altitudes with the involvement of the native populations and the various other organizations (State, Central and NGOs). There is also an urgent need for the development of conservation repositories like herbal gardens, nurseries and encouraging farmers to cultivate threatened medicinal plants of the state. Although there are many Governmental and non-Governmental organizations putting their efforts for the conservation of these important plants, there are many other commercially important plants whose conservation technologies are yet to be standardized. Development of Conservation technologies for these plants will not only help in stimulating mass cultivation in fields but also, aid in reducing pressure on wild stock.

Recommendations

- Government should distribute saplings each year among the villagers to plant them.
- Media should be used to save nature and its importance.

- Initiating afforestation projects and controlling over grazing.
- Reducing biotic pressure by supplying gas and electricity.
- Establishment of nurseries and botanical garden as well as local community awareness and involvement to protect these national assets will be the best conservation measure.
- Commercial exploitation of medicinal plants should make sure to safeguard the intellectual property rights of local people.
- Providing educational material in native languages to update collectors about occurrence of medicinal flora, their therapeutic significance, and market values.
- It is important to identify valuable species, precisely map their distribution, document their status, study their life cycle, and formulate guidelines for their conservation and management.

Conclusion

Medicinal plants represent and contribute significantly to human health. Use of medicinal plants by Kashmiri People from has a long history and here we reported on 81 medicinal plant species used in the traditional health care systems of Kashmir. This is the most comprehensive review to date and may provide a base for further endeavors knowledge related to medicinal plants of Kashmir. The multiple uses reported in this study indicate that scientific investigations are useful in the validation of traditional medicinal practices for the development of new therapeutic agents from medicinal plants of Kashmir

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