

# Study of Challenges and Opportunities in Northern India's Growth of the Medicinal Plant Sector: A Review

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**Abstract – The study goals were to Study of challenges and opportunities in Northern India's growth of the medicinal plant sector. The survey reveals that there is a rich diversity of significant medicinal plants in northern India, and attempts are being made at various levels to utilize this resource to build up the medicinal plant sector.**

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## INTRODUCTION

Since days of yore, people have been using plants for basic preventive and corrective medical care. (1). Medicinal plants are used by ladies taking consideration of their families at the household level, by medicine men or ancestral shamans at the degree of the town. More than 4.3 billion individuals, rely upon conventional plant-based medicine systems to give them essential medical care, according to the World Health Organization (2). Allopathic medicine owes a colossal obligation to medicinal plants as well: one in four prescriptions filled in a nation like the United States is either a synthesized type of plant materials or got from them (3).

It is clear, even from the earliest exchange information accessible, that the worldwide medicinal plant market has always been enormous. As far back as 1967, according to the International Trade Center, the absolute estimation of imports of plant-based starting materials to the drug and cosmetics industries was USD 52.9 million. The all out worth developed from this add up to USD 71.2 million in 1971, and then showed a steady yearly growth pace of around 5-7 percent through to the mid-980s (4).

Notwithstanding, the genuine significance of the medicinal plants sector has started to be acknowledged uniquely during the last decade. Interest in characteristic materials by the dominant monetary powers had decreased from the late 1960s to the mid 1980s as additional opportunities in biotechnology and medication synthesis were pulled in. Yet, there was a reestablished interest in regular materials and apps by the mid-980s (5, 6).

Its new strength and significance is also attested by the cooperation of various companies on the lookout.

By 1990, some 223 significant companies around the world (of which about half were in the United States) were supposedly screening plants for new leads; the figure was zero in 1980 (7).

## CHALLENGES IN MEDICINAL PLANTS SECTOR

One of the causes of worry in meeting the everyday requirements of food and medicine is the continuous increase in the human populace as the economy and livelihoods of human societies living in developing countries depend essentially on forest products. This wonder leads to the continuous erosion of forest and forest products, making it hard to agree to the requirements and to conserve useful bio-resources. In the Materia Medica, an ever increasing number of species are being added slowly; notwithstanding, the norms of their virtue and right ID don't stay up with the expansion process. Market prices for medicinal plants and determined materials give just restricted insight into the functioning of the market, rather than precise information available, supply and demand. On the basis of examining current information about the medicinal plants sector, we have recognized the following main characteristics and challenges (8).

## INCREASING RARITY

Among the causes of the danger to medicinal plant species is the weakening of customary laws that have directed the use of characteristic resources. Current socio-financial forces have often demonstrated to easily weaken these customary laws. In medicinal plant species, there are numerous other expected causes of extraordinariness, such as living space specificity, tight scope of district construction, disturbances of land use, introduction of non-natives, adjustment of environment, climatic changes,

substantial live-stock grazing, human populace explosion, populace discontinuity and debasement, populace bottleneck, and hereditary float. Likewise, characteristic enemies (i.e., pathogens, herbivores, and seed predators) could significantly restrict the wealth of uncommon species of medicinal plants in some random zone (9).

An estimated 4,000 to 10,000 medicinal plant species are facing possible nearby, public, local or worldwide extinction, with severe consequences for livelihoods, economies and wellbeing systems as a result. In spite of the fact that there are a couple of studies on Northern India's uncommon and jeopardized medicinal plant species, none of these studies have a total informational collection for even a single species (10).

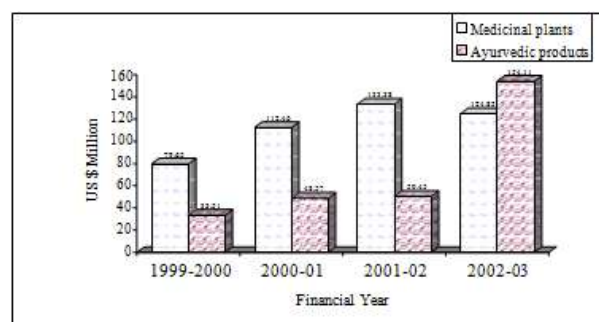
Notwithstanding, the small accessibility of populace and quantum information on uncommon species in nature has restricted their arrangement to a couple of species on the basis of the assortment of herbarium species and the consultation of a couple of experts. The legitimacy of the current assessments on the assignment of danger categories to species, including the quantity of taxa at risk for specific areas, is also questioned. Because of the intense and inaccessible terrain, inhospitable climatic conditions, and the short life pattern of plants, problems with the assessment of the species are increasing in the mountainous locale, especially in high elevation areas. Most of the accessible information has been gathered from areas in these mountains that are easily accessible. These same areas are also assaulted for medicinal plant assortment by indigenous communities and business spice collectors. Therefore, the estimated populace density of classified uncommon medicinal plants is not precise because it differs from areas that have never gone through any assortment of such uncommon medicinal plant species (11).

## RISING DEMAND

Demand for medicinal plant-based crude materials is growing at a yearly pace of 15 to 25 percent, and demand for medicinal plants is probably going to increase by more than US\$5 trillion in 2050, according to WHO estimates. The medicinal plant-related exchange India is estimated to associate with US \$1 bil-lion every year. The amount of exports of Ayurvedic products created in India has, according to an estimate, significantly increased between the last two financial years (2001-2002 and 2002-2003; Figure 1).

More than 95 percent of the 400 plant species used by various industries in the planning of medicine are harvested in India from wild populations. Harvesting medicinal plant shoots and leaves may decrease their photosynthetic capacity, as well as their survival potential and successful proliferation. Harvest capacity to bear medicinal plants varies with climatic conditions as the calm herbs become exceptionally helpless against individual harvesting. What's more, increasing demand for shrinking habitats may prompt the

neighborhood extinction of numerous species of medicinal plants (12).



**Figure 1: Annual trends in India's exports of Ayurvedic products and medicinal plants over the past four financial years (22).**

The previous far off green forests have now become part of an energetic, profit-seeking economy and internationally demanding pluralist politics. Therefore, reducing the pressure on various forest products, especially on medicinal plants, is an extreme test for strategy makers and economists the same. The nearby tradition of worldwide significance is medicinal plants. A system that would assist biodiversity with being used in a judicious and controlled way was concurred by the Rio Convention on Biological Diversity. Most of the issues concerning the assurance of the legitimate status of indigenous information and the compensation for that information by indigenous home grown practitioners are amazingly convoluted. There are arguments for the present status of compensation or advantage sharing under intellectual property rights, considered by one gathering to be another authoritative document of bio-robbery, while other groups contend that the privilege to intellectual property is a legitimate instrument for protecting the rights of information holders (13).

## BIO-PROSPECTING AND BIO-PIRACY

A system that would assist biodiversity with being used in a judicious and controlled way was concurred by the Rio Convention on Biological Diversity. Bio-prospecting is at present taking spot in a climate of suspicion and growing tension between bio-theft and the privilege of developing and created countries to share benefits. Most of the issues concerning the assurance of the legitimate status of indigenous information and the compensation for that information by indigenous natural practitioners are very confounded. There are arguments for the present status of compensation or advantage sharing under intellectual property rights, considered by one gathering to be another authoritative document of bio-robbery, while other groups contend that the privilege to intellectual property is a legitimate instrument for protecting the rights of information holders (13).

The confusion has been extended by various ways and systems of patenting medicinal plants in India, the United States, Europe, Canada and other countries (14). In the United States, notwithstanding, patents might be petitioned for any living organism got from human invention, such as by breeding or research facility based control. The 2001 Indian Plant Varieties Protection and Farmers' Rights Act recognizes the commitment of farmers who are effectively involved in breeding programs. Furthermore, this Act contains provisions for advantage sharing, recognizing neighborhood communities as contributors of plants (14).

Shockingly, there is a wide hole in the patenting of products among created and developing nations, such as India. Of these, residents comprise just 0.2 percent of the aggregate and 2.3 percent of those registered in developing countries. Furthermore, 97.7% of the all-out patents recorded so far are for the benefit of non-residents who are solely subject to the control of fare markets in developing countries. More specific rules on recording the ethnicity of samples and sharing their benefits between the countries of origin, the inventor, and the business sponsors are needed by developing nations and numerous researchers who need to misuse medicinal plants. There is no inclination for some created nations to acknowledge such provisions. Numerous scientists who accept that normal products remain the most promising source for new drugs have been frustrated by these conflicts (15).

## CULTIVATION OF MEDICINAL PLANTS

For less than 10%, information on the proliferation of medicinal plants is accessible, and for just 1 percent of the complete plants known around the world, agro-innovation is accessible. This pattern shows that one of the areas of focus for research should be developing agro-innovation. Furthermore, farming of these plant species is basic in request to satisfy the increasing need for medicinal plants. Farming can conserve the wild hereditary diversity of medicinal plants, notwithstanding meeting the current demand.

Studies on the agro-forestry of medicinal plants elsewhere indicate that since numerous medicinal plant species like to develop under forest cover, agroforestry offers a helpful strategy for their development and conservation by integrating shade-tolerant medicinal plants in multi-state system as lower strata species, cultivating short-cycle medicinal plants as inter-crystals. In any case, it is understood that the development of medicinal plants is not an easy task, as is reflected in the history of medicinal plant farming. Because of the long development pattern of medicinal plants such as *Saussurea costus*, numerous farmers in the trans-Himalayan area of northern India have supplanted medicinal plants cultivated with normal crops [i.e. peas (*Pisum sativum*), potatoes (*Solanum tuberosum*) and hops (*Humulus lupulus*)]. In northern India, the cost of numerous medicinal plants is lower

than that of numerous seasonal vegetables, causing scanty farming of medicinal plants (16).

Various organizations are making attempts to develop diverse medicinal plant species, including uncommon and imperiled categories. Various organizations have created agro-innovation for around 20 species of uncommon and jeopardized medicinal plants from northern India. Be that as it may, with various medicinal plant species, the per hectare development cost, complete yearly creation and cost advantage ratios change. Rheumemodi was determined as the most gainful cash crop for the medicinal plant in terms of total compensation age in northern India out of 10 selected uncommon and imperiled medicinal plant species (Table 1). Nonetheless, most medicinal plant species are presently developed on a small scale and are restricted to a couple of hectares of land in various states of northern India. Likewise, numerous farmers are uninformed of the office accountable for issuing permits. Unless farmers are allowed the necessary permits for development, they are compelled to sell their products on the illicit market, exposing them to activity by government agencies and the abuse of intermediaries.

**Table 1: Seedling survival, total cost of cultivation, and net income by cultivation of 10 important species of the rare and endangered medicinal plants**

Species	Seedling survival (%)	Seed required per hectare (gm)	Total cost of cultivation (US \$)	Total production (kg/ hectare)	Income (US \$)	Net income (US \$)
<i>Aconitum holzneri</i>	60-70	614	2117	495	2692	575
<i>Aconitum</i>	60-70	614	2258	83	4528	2270
<i>Actinophyllum</i>						
<i>Angelica glauca</i>	70-80	100	1630	1000	2174	544
<i>Carum cori</i>	>90	500	1652	650	2826	1826
<i>Nordostachys</i>	50-60	600	2723	1129	6135	1412
<i>jatamansi</i>						
<i>Pteranthus kurroo</i>	50-60	64	1117	632	1663	546
<i>Polypodium</i>	50-60	32,125	2718	4000	5218	2500
<i>Acrostichum</i>						
<i>Rheum emodi</i>	60-70	600	3044	9000	17103	14140
<i>Rheum moorcroftianum</i>	50-60	600	3044	4100	7130	4087
<i>Saussurea costus</i>	80-90	500	1783	3500	2283	500

Source: (17) Nautiyal and Nautiyal 2004.

## STRENGTHENING LEGALIZED MARKET SYSTEM

In the field of medicinal plants, the marketing system is generally unregulated and inequitable. The collectors of medicinal plants are by and large marginal farmers and laborers. They get cash income by selling medicinal plants to meet their basic requirements for food, wellbeing and youngsters' schooling. They are often ignorant of the genuine market prices for some species of medicinal plants. All in all, there is a top-down methodology in the medicinal plants sector and even the numerous stakeholders at the base are uninformed of the increasing demand for their item and the accessibility of their market. The farmers had developed Kut (*Saussurea costus*) and Dolu (*Rheumemodi*) in some villages in the Chamoli district of Uttaranchal, however they couldn't sell them because of an absence of marketing system information. In contrast,



numerous species of medicinal plants are exchanged through unlawful channels (18).

Wild medicinal plants are favored over developed plants on numerous occasions, as there is an overall feeling that wild plant species contain a superior compound substance. The adjustment in substance content also depends on the harvesting seasons of the species and the various stages of the growth of the species. The medicinal plant seg-peak is to a great extent less reported and ineffectively controlled. Therefore, because of the enormous illicit exchange, the economy created by this sector is not precise. On several occasions, the financial benefits and the board costs for wild populations are ineffectively estimated (19).

## OPPORTUNITIES IN DEVELOPING THE MEDICINAL PLANTS SECTOR

Northern India has a wide assortment of medicinal plant species across the various forest types along a height inclination to build up the 'natural industries' (as discussed in the use and diversity of medicinal plants). Such a high assortment of medicinal plants would be useful for further scientific research to investigate their clinical effectiveness, add worth and use in the treatment of various old and new diseases. India has just established a standing in the worldwide market as a minimal effort producer of top notch conventional drugs. This reality can be used for the marketing of home grown products delivered in India as a significant instrument. India's objective of building a brilliant triangle between customary medicine, present day medicine and current science is relied upon to be a shelter for the advancement of conventional home grown medicine and the medicinal plant industry (20).

## INSTITUTIONAL SUPPORT

Numerous administration and non-legislative organizations in India have focused on improving the medicinal plant sector in India (Table 2). Funding opportunities have been made to assist the individual who is set up to work and to assemble the limit of the medicinal plants. Projects can be submitted for funding under the mandate of the NMPB under two significant schemes: a limited time scheme and a business scheme. The main focus areas of the limited time scheme are the survey and inventory of medicinal plants, the in-situ servicing and ex-situ development of selected medicinal plants, the creation of value planting materials, the dissemination of ability through instruction and correspondence, the advancement of the worldwide and domestic market system, and the strengthening of research, improvement and human force. The mass creation of medicinal plants and the provision of value planting materials, the expansion of selected medicinal plant farming areas, the additional incentive in the harvesting, processing and marketing of medicinal plants and the improvement of innovative marketing mechanisms are the main areas of focus within the business scheme.

Notwithstanding the two main themes, the job of the NMPB is to coordinate the turn of events and reinforcement of medicinal plants with the various ministries, departments, organizations, state and association governments. Contacts with public and international organizations gave to similar mandates and objectives are one of NMPB's main roles. Roughly 35,000 hectares of land have been selected and put under development for enormous scale farming of financially significant medicinal plants under the supervision of the NMPB. Authoritative farming is one of the NMPB schemes in which any gathering, institution or person with in any event 3 years of involvement with the field of medicinal plants is qualified to get at any rate 30% of the complete venture cost of financial assistance.

A single task to study the medicinal plants of the Himalayan locale was dispatched ten years before the establishment of NMPB (1992-93 financial years)[72]. Out of the all out of 4254 projects endorsed by the NMPB in the course of recent years, 732 projects were affirmed in 11 slope states in northern India. It is normal that every one of these projects will strengthen the medicinal plant sector, connect the gaps and address the difficulties of developing the sector.

**Table 2: Major institutions involved in funding projects to the medicinal plants research in India**

Institutions	Funding for major areas in medicinal plants research
National Medicinal Plants Board, NMPB	Survey, documentation, cultivation, marketing, conservation
Department of Science & Technology, DST	Taxonomy, ecology, pathology, survey, propagation, documentation, cultivation, conservation
Council for Scientific & Industrial Research, CSIR	Ecology, taxonomy, biochemistry, survey, documentation, cultivation, genetic, agro-technology, conservation
Indian Council of Medical Research, ICMR	Breeding, value addition
All India Council for Technical Education, AICTE	Management technology
Department of Biotechnology, DBT	Agro-technology, molecular biology, biochemistry, rural biotechnology
Defense Research & Development Organization, DRDO	Agro-technology, survey, documentation, conservation
Indian Council of Agricultural Research, ICAR	Breeding, pathology, molecular biology
Ministry of Environment & Forests, MoEF	Survey, documentation, conservation, management, ecological impact assessment, cultivation
National Bank for Agriculture and Rural Development, NABARD	Cultivation, marketing
University Grant Commission, UGC	Ecology, biochemistry, survey, documentation
Herbal Research and Development Institute, HRDI	Survey, documentation, nursery development
G.B. Pant Institute of Himalayan Environment & Development, GEPHEO	Survey, documentation, cultivation, conservation

## EXISTING POLICIES

A strategy archive on the limited time and business aspects of the medicinal plant sector has been drawn up by the Planning Commission and the National Medicinal Plants Board (NMPB) of the Government of India. Also, 32 were organized by the NMPB and 24 medicinal plant species were selected by the Planning Commission for R&D in request to meet the desired objective of the medicinal plant sector (Table 3). Numerous rules for the sustainable use of medicinal plants and to decrease the chances of bio-robbery have been introduced by the Biodiversity Act 2002 (21).

## CONCLUSION:

Northern India's conventional clinical systems, such as Ayurveda and Tibetan, are important for a dependable culture and are still respected by

individuals today. For over 3,000 years, these traditions have successfully set an illustration of common resource use in curing numerous unpredictable illnesses. Several benefits of such eco-accommodating traditions exist. The plants used are promptly accessible for various therapies, are easy to transport and have a moderately long shelf life. Minimal side effects and moderately low costs contrasted with synthetic medicines are the most significant advantages of home grown medicine. The success of the medicinal plant sector depends, specifically, on the awareness and interest of farmers and their other stakeholders, on supportive government policies, on the accessibility of assured markets, on profitable value levels and on the assessment of simple and proper agro-techniques. Successful establishments in the medicinal plant sector can assist with increasing rustic business, boost exchange far and wide and add to millions of individuals' wellbeing.

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