



**CUTS Centre for  
International Trade,  
Economics & Environment**

# **DATABASE ON MEDICINAL PLANTS**

**कट्स ✕ CUTS**  
**Consumer Unity &  
Trust Society (CUTS)**  
India

 **SAWTEE**  
SOUTH ASIA WATCH ON TRADE, ECONOMICS & ENVIRONMENT  
**South Asia Watch on Trade,  
Economics and Environment  
(SAWTEE) Kathmandu**

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This Report has been researched and compiled by Dr. Ghayur Alam of the Centre for Sustainable Development, Dehradun for CUTS Centre for International Trade, Economics & Environment. The opinions expressed in the report and any errors of fact or interpretation or omission are the responsibility of the author, and do not reflect the agreed policy positions of the publishers.

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**Published by:** **CUTS Centre for International Trade, Economics & Environment**  
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Telefax: +91-33-2460 1424, Fax: +91-33-2440 7669  
Email: cutscal@vsnl.com / cuts-calcutta@cuts-international.org  
Website: www.cuts-international.org

**Supported by:** Ford Foundation, New Delhi  
Action Aid, Nepal

**Printed by:** R. K. Printers, Calcutta 700 024

**ISBN:** **81-8257-028-X**

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This Report is made under the Regional Programme on "Farmers' Right to Livelihood in the Hindukush Himalayan Region" initiated by South Asia Watch on Trade, Economics & Environment (SAWTEE), based in Kathmandu in association with its member organisations including Consumer Unity & Trust Society (CUTS), India.

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## PREFACE

The ineluctable challenge before the world today is to turn around the wheel of perpetual poverty, hunger, ill health and illiteracy. The UN adopted Millennium Development Goals “commit the international community to an expanded vision of development, one that vigorously promotes human development as the key to sustaining social and economic progress in all countries”. Needless to say, sustaining economic progress is inseparably linked with sustainable livelihood and attainment of basic necessities of life. Focus on health and food security emerges as the natural corollary.

When so much dust is being raised on the formulation and implementation of policies to break the chains of poverty, the significance and importance of medicinal plants remain largely unaddressed. Medicinal plant addresses twin problem of promoting sustainable livelihood and treating numerous illness. Medicinal plant, on the one hand, can serve as major source of earning to the indigenous farmer community and on the other, it embodies rich repository of traditional medicinal knowledge. The Declaration of the 7th ASEAN Health Ministers Meeting held on 22 April 2004 at Penang, Malaysia mentioned that in “our countries traditional medicine (TM) as well as complementary and alternative medicine (CAM) are at times the most widely available and affordable source of health care.”

In this era of trade liberalisation, there is increasing concern about protecting the indigenous medicinal knowledge of the traditional farming community of the developing countries. The World Trade Organisation (WTO) agreement on TRIPs (Trade Related Aspects of Intellectual Property Rights) introduced intellectual property rules into the multilateral trading system for the first time. IPRs are legal instruments which provide protection to inventions. Types of IPR vary between patent, plant breeders’ rights, copyrights, trademarks etc.

However, in many instances rich countries and powerful corporations have captured a disproportionate share of the benefits of trade where bio-piracy has continuously become a major concern. It has been found out that industrial countries hold 97 percent of patents worldwide, and more than 80 percent of patents in developing countries. More than half of the world’s most frequently prescribed drugs are derived from plants or synthetic copies of plant chemicals. It is estimated that if only 2 percent royalty were charged on genetic resources developed by local innovators in the South, the North would owe billions of dollars in unpaid royalties for medicinal plants. Some plants which indigenous peoples have discovered, cultivated, and used for food, medicine, and for sacred rituals got patented in the United States, Japan, and Europe. A few examples of these are ayahuasca, quinoa, and sangre de drago in forests of South America; kava in the Pacific; and turmeric and bitter melon in Asia.

The importance of traditional medicinal plants in conservation of biological diversity also merits attention. The UN Secretary General’s message on International Day for Biological Diversity on May 22, 2004 reverberated this while explaining this year’s theme “Biodiversity: Food, water and Health for All” which “underlines biodiversity’s importance in ensuring food security and ....in protecting wide array of traditional medicines ....based on world’s biological riches”.

It is against this backdrop that developing countries need to promote proper policy mechanism for conservation and promotion of cultivation of medicinal plants. Subsequently arises the need to develop substantial and comprehensive database of medicinal plants highlighting the properties of those species as also to keep a strong vigil on endangered species. This report is a diligent and sincere effort to fill in the gap of reliable information on the quantity of collection and cultivation of medicinal plants, their commercial potential, existing marketing mechanisms and ensure promotion and conservation and rational utilisation of medicinal plants.

The areas covered under this study are four states of Central and North Eastern Himalayas in India. The states are Uttarakhand, Arunachal Pradesh, Himachal Pradesh and Meghalaya. Chapter I introduces the growing importance of medicinal plants in the world economy, its contribution to livelihood of mountain communities and provides a brief overview why large number of medicinal plants are threatened with extinction. Chapter II projects the picture of medicinal plants in the Himalayan states under study. The factors preventing the mountain farmers in undertaking cultivation of medicinal plants as a source of sustainable livelihood and promotion and implementation of different government policies for both cultivation and conservation of medicinal plants are the major issues of analysis in this chapter. Detailed description of 35 most important medicinal plants found in these states with their medicinal properties are provided in Chapter III. The study ends with conclusion and some major recommendations like providing the farmers with better marketing facilities, preparation of comprehensive biodiversity register, facilitating the role of civil society by government in strengthening the medicinal plant sector etc. in Chapter IV.

It is sincerely hoped that our efforts in bringing out this treatise would help the mountain farmer of the Hindu Kush Himalayan region in his strive towards a sustainable livelihood and development and also create an awareness among the various other stakeholders.

## Medicinal Plants: Introduction

### 1. Introduction

*A large number of people in the Himalayan region derive employment and income from the collection, processing and trade of medicinal plants.*

Medicinal plants are an important source of raw material for traditional medicines and a large number of people derive employment and income from the collection, processing and trade of these plants. With the sharp rise in popularity of traditional medicine, the economic importance of these plants has increased enormously. The role of medicinal plants is particularly important in the Himalayan region. These areas are richly endowed with a large variety of plant species, many of which have medicinal properties. A large proportion of the rural population in these areas depends on locally available medicinal plants to meet their health care requirements. Furthermore, the collection and marketing of these plants provide an important source of income for communities living in the mountain areas. Unfortunately, the increase in demand has also increased the threat of depletion, as many of these plants are largely collected from the wild.

*This study is undertaken with the objective to fill the gap of reliable information on the quantity of collection and cultivation of medicinal plants, their commercial potential and analysing the existing marketing mechanism to promote commercial cultivation of medicinal plants.*

While the importance of medicinal plants is widely accepted, there is a serious lack of comprehensive information on the economically important and threatened species in the Himalayan region. Similarly, while the State Governments have a number of policies to promote conservation and cultivation, there is little information on the effectiveness of these policies. This study is undertaken with the objective to fill the gap of reliable information on the quantity of collection and cultivation of medicinal plants, their commercial potential and analysing the existing marketing mechanism to promote commercial cultivation of medicinal plants. It examines these issues in four Himalayan states: Uttaranchal, Himachal Pradesh, Arunachal Pradesh and Meghalaya.

The study is based on secondary sources, which include books, papers in technical journals, newspapers and government reports. This report, which is based on the findings of the study, has four chapters. Chapter 1 continues with a brief description of the issue of conservation of medicinal plants and their role in providing livelihood opportunities. Chapter II discusses the status of medicinal plants and government policies in these states. Chapter III contains a database on the 35 most important species found in these states. The choice of these species has been made on the basis of environmental concerns and their potential to generate income through cultivation. The conclusions and recommendations are presented in Chapter IV.

### 2. Medicinal Plants: Their Growing Importance

A large proportion of the world's population depends on traditional medicine to meet its health needs. According to estimates, the proportion of the world's population using traditional medicine ranges between 70-80 percent.<sup>1,2</sup> Furthermore, the popularity of traditional medicine in developed countries has grown swiftly in recent years. For example, in Europe and North America, the sector has grown at 10-20 percent annually during 1990s.<sup>3</sup> Traditional medicine primarily depends on medicinal plants for



raw material. Worldwide a huge number of plant species is used to provide the raw materials needed by the various systems of traditional medicine. China and India alone use thousands of plant species.<sup>4</sup>

*The market of traditional systems of medicine in India is estimated to be about Rs. 4000 crores. The overall demand for medicinal plants is expected to increase at about 15 to 16 percent between 2002 and 2005.*

With the revival of Indian traditional medicinal systems, the domestic demand for medicinal plants has seen a rapid increase. The market of traditional systems of medicine in India is estimated to be about Rs. 4000 crores. The Ayurvedic drug market alone accounts for about Rs. 3500 crores. Furthermore, the Indian market for Ayurvedic medicines is estimated to be expanding at 20 percent annually.<sup>6</sup> Over one and a half million practitioners of the Indian System of Medicine in the oral and codified streams use medicinal plants in preventive and curative applications. There are estimated to be over 7800 manufacturing units in India. In addition, there is a large and growing market for food supplements and cosmetics. The overall demand for medicinal plants is expected to increase at about 15 to 16 percent between 2002 and 2005.<sup>7</sup>

*In addition to the domestic market, there is a large and expanding international trade in medicinal plants. About 2500 species of medicinal plants are traded in the international market.*

In addition to the domestic market, there is a large and expanding international trade in medicinal plants. It is estimated that about 2500 species of medicinal plants are traded in the international market.<sup>8</sup> An average of 400,000 tonnes of medicinal plants, valued at \$1.2 bn, were estimated to be traded annually during 1990s.<sup>9</sup> The main markets include Europe, North America and Asia. Europe, which accounts for about 50 percent of the world market, is the largest.<sup>10</sup> The three leading exporting countries are China, India and Germany.<sup>11</sup> India's export of medicinal and herbal plants is expected to grow from about Rs. 446 cr in year 2000 to Rs.3000 cr annually by 2005.<sup>12</sup>

### 3. Conservation

*The rising commercial demand for herbal drugs and dependence on material harvested from the wild, has led to the rapid depletion of a number of medicinal plant species.*

A large proportion of medicinal plants is collected from the wild.<sup>13</sup> In most of the countries, the proportion of collected material ranges between 70-99 percent.<sup>14</sup> The rising commercial demand for herbal drugs and dependence on material harvested from the wild, has led to the rapid depletion of a number of medicinal plant species.<sup>15</sup> As a result, a large and increasing number of medicinal plant species are threatened with extinction. For example, according to the International Union for Conservation of Nature and Natural Resources (IUCN)<sup>16</sup> Red List of Threatened Species, more than 300 plant species, of which a large number are medicinal plants, are threatened with extinction. This is for a number of reasons:

*IUCN Red List of Threatened Species mentions more than 300 plant species, of which a large number are medicinal plants, are threatened with extinction.*

- \* Non-sustainable harvesting by plant collectors has resulted in the depletion of many medicinal species. Non-destructive, low-intensity collection practices have often been replaced by destructive harvesting practices.
- \* There has been a steady decline in the use of traditional knowledge and medicinal plants by the local communities. As a result, the interest of these communities in conservation has declined.
- \* There has also been a shift from local use of medicinal plants to commercial sale. With the improvement in transportation networks, remote forest areas have become increasingly accessible to outside traders. Also, there has been a large increase in the international demand for medicinal plants. As a result, large volumes of commercially important species are being harvested beyond sustainable levels.
- \* The marketing chains are long. As the number of agents involved between the collection of plants and their final sale to the user industry/consumers is large, the prices paid to the collectors are low. This



forces them to over-harvest the material to supplement their income. For example, in India, the difference between the prices paid to collectors and the final market prices ranges between 50 percent-255 percent.<sup>17</sup> In Mexico, medicinal plant collectors receive only 6 percent of the final market price.<sup>18</sup>

*The conservation of medicinal plants is vitally important for the maintenance of biodiversity and the preservation of indigenous knowledge. Two ways of conservation of medicinal plants - in situ and ex situ conservation are worth mentioning here.*

It is clear that the conservation of medicinal plants is vitally important for the maintenance of biodiversity and the preservation of indigenous knowledge.<sup>19</sup> Broadly speaking, two ways of conservation of medicinal plants - in situ and ex situ conservation are worth mentioning here. The 'in-situ' conservation refers to the site conservation wherein a wild species or stock of a biological community is protected and preserved in its natural habitat (environment). This implies promoting cultivation process in protected areas. Conservation of medicinal plants can also be accomplished by the ex-situ i.e. outside natural habitat by cultivating and maintaining plants in botanic gardens parks, other suitable sites, long term preservation of plant propagules in gene banks (seed bank, pollen bank, DNA libraries, etc.) etc.

*Current conservation efforts are not enough to ensure the survival of some threatened species. This would require strict enforcement of environmental regulations.*

However, it must be pointed out that current conservation efforts are not enough to ensure the survival of some threatened species. This would require strict enforcement of environmental regulations.<sup>20</sup> Furthermore, cultivation could also provide large opportunities of livelihood through income and employment generation.

#### **4. Contribution to Livelihood**

*A large number of people living in the mountain areas depend on the sale of medicinal plant, collected from the wild, for their livelihood. As large scale collection can put extreme pressure on resources, there should be policies to promote the cultivation of medicinal plants.*

Medicinal plants and associated knowledge are an integral part of the mountain communities' life. They play a vital role in these communities' holistic approach to health and well being. Furthermore, they also provide an important source of income. A large number of people living in the mountain areas depend on the sale of medicinal plants for their livelihood. A very large proportion of these plants are collected from the wild. There is an increasing concern that, as large scale collection can put extreme pressure on resources, this practice is not sustainable, It is felt, therefore, that the cultivation of species that are in large demand could provide an alternative source of livelihood to farmers in these areas. Many countries, including India have policies to promote the cultivation of medicinal plants. However, globally only a handful of species are being cultivated on a large scale. Furthermore, the process of cultivation, in many cases, does not include plants having high global demand.<sup>21</sup> Even in China, where the cultivation of medicinal plants is the largest, only 100-250 species are being cultivated on a large scale.<sup>22</sup> More than 80percent of the medicinal plants used in China come from wild sources.<sup>23</sup> In Europe, only 130-140 of the 1200-1300 species of native medicinal plants are derived predominantly from cultivation.<sup>24</sup>

*As the material collected from the wild is available at low prices, there is little economic incentive for farmers to take up the cultivation of medicinal plants.*

While there is great potential in the cultivation of medicinal plants, it is limited by a number of factors. The most important of these, perhaps, is the downward pressure on prices exerted by large- scale collection from the wild. As the material collected from the wild is available at low prices, there is little economic incentive for farmers to take up the cultivation of medicinal plants. Other reasons include lack of cultivation technology, shortage of planting material, long gestation periods and lack of marketing infrastructure in the remote areas.

## Medicinal Plants in the Himalayan States

### 1. Introduction

*More than 8000 species of wild plants are known to be used in India for the treatment of various health problems.*

*Although the Himalayan region occupies only 15 percent of the country's geographical area, it accounts for about 30 percent of the endemic species found in the Indian sub-continent.*

*Medicinal plants provide a significant source of income for the rural poor in India. The contribution of medicinal plants to rural income is particularly important in tribal belts and in the Himalayan region.*

*Many people in the Himalayan region use medicinal plants and associated knowledge to treat a variety of ailments. The Bhotia people of the Central Himalayas use over 150 different medicinal plants to treat more than 105 combinations of diseases.*

India has a rich diversity of medicinal plants; more than 8000 species of wild plants are known to be used in India for the treatment of various health problems.<sup>25</sup> The Himalayan region is particularly well endowed with medicinal plant species.<sup>26</sup> This is largely because of the diverse agro-climatic conditions which exist in the area. These vary from dry deciduous forests and alpine meadows in the north-west, to rain forests in the north-east. Although the Himalayan region occupies only 15 percent of the country's geographical area, it accounts for about 30 percent of the endemic species found in the Indian sub-continent.<sup>27</sup> Moreover, the medicinal plants found in the Himalayan areas include species of particularly high medicinal value.<sup>28</sup>

Common with the rest of the Himalayan region, the states under consideration have a large variety of medicinal plants. For example, Himachal Pradesh has about 3,000 plant species of which almost 500 have medicinal properties. Arunachal Pradesh is also known to have over 500 species of medicinal plants. Uttaranchal and Meghalaya are also known to have a large number of medicinal plant species.

Medicinal plants provide a significant source of income for the rural poor in India. According to one estimate, about 50 mn people rely on non-timber forest products (NTFP), the most important of these being medicinal plants.<sup>29</sup> The collection and processing of medicinal plants contribute to at least 35 mn workdays of employment annually.<sup>30</sup> The contribution of medicinal plants to rural income is particularly important in tribal belts and the Himalayan region. This is clearly shown by the example of the Great Himalayan National Park in the Kulu valley. Approximately 11,000 people live in a five-km wide belt around the Park. As other options of livelihood are limited, the collection of medicinal plants provides a vital source of income for these people.<sup>31</sup> The combination of guchhi and medicinal herb sales contributes an average income of over Rs. 10,000 per family in 1997 for villages around the park.<sup>32</sup>

Furthermore, many people in the area depend on traditional knowledge, local healers and medicinal plants to meet their health needs. They use these plants and associated knowledge to treat a variety of ailments. For example, the Bhotia people, living in the high altitude areas of the Central Himalayas, use over 150 different medicinal plants to treat more than 105 combinations of diseases<sup>33</sup>.

Though India has a rich biodiversity, the growing demand is putting a heavy strain on the existing resources. The issue of medicinal plant involves tremendous contemporary relevance because it can on one hand ensure health security to millions of people and on the other hand it can provide new and safe herbal drugs to the entire world.

### 2. Collection

*The large increase in the domestic and global demand for medicinal plants has put extra pressure on forest resources. Both the intensity and duration of collection has recently increased resulting in depletion of forest resources.*

As mentioned earlier, a large proportion of medicinal plants are collected from the wild. This is true for the states under study, where up to 90 percent of the material is extracted from the wild.<sup>34</sup> The large increase in the domestic and global demand for medicinal plants has put extra pressure on forest resources. Reports show that both the intensity and duration of collection has recently increased. For example, the annual period of collection in the Gori valley of Pithoragarh district has increased from 2 months to 5 months.<sup>35</sup> Similarly, farmers in Johar valley in Uttarakhand report that because of depletion, the volume one person can collect has declined significantly in recent years. According to one collector in the Pithoragarh district of Uttarakhand, earlier they used to collect about 200 grams of dry Atish (*Aconitum heterophyllum*) in one day; now they do not get more than 70-100 grams.

*How to break the hold of contractors over collection of medicinal plants continues to be an important challenge.*

The issue of exercising strong control of contractors and middleman over the collectors of medicinal plants deserve particular attention. An important reason being the collectors' dependence on loans and marketing expertise. As most collectors are poor, they need to borrow from the contractors. This keeps the collectors tied to the local contractors. This practice is widespread, and how to break the hold of contractors over collection of medicinal plants continues to be an important challenge.

*To reduce the role of contractors in collection in Uttarakhand the contract to collect is now given only to village community organisations, called "samooch".*

There have been recent attempts to reduce the role of contractors in collection. For example, in Uttarakhand the contract to collect is now given only to village community organisations, called "samooch". Unfortunately, the contractors have set up their own "samoochs". This has enabled them to maintain their control over collection activities.

In the states under study the local contractors organise most of the collection of medicinal plants. The collectors are either wage labourers or farmers with small land-holdings. There is a general feeling that this system, which depends on contractors and sub-contractors, contributes to both excessive and illegal collection. The system allows them to market illegally collected material with legal material. A recent study carried out by CECI-India (affiliated to the Centre for International Studies and Cooperation, Canada<sup>36</sup>, indicated that from a single district of Pithoragarh in Uttarakhand, more than 1300 tons of medicinal and aromatic plants (MAPs) are collected and traded annually, most of them illegally.

Large-scale collection has led to a significant depletion of important species in some areas. There is a serious threat to a number of medicinal plants because of over exploitation. Seventeen species found in the Himalayan region are listed in the Red Data Book of India.<sup>37</sup>

### 3. Cultivation

*Additional supply of medicinal plants through cultivation can also reduce pressure on wild resources, thus contributing to conservation of biodiversity.*

Cultivation of medicinal plants has to be encouraged for meeting the future needs. The cultivation of medicinal plants could provide farmers with an attractive opportunity to increase their incomes. The additional supply of medicinal plants through cultivation can also reduce pressure on wild resources, thus contributing to conservation of biodiversity.

*Cultivation of medicinal plants can be more profitable for farmers than the cash crops being grown currently.*

The data on the cost of cultivation of medicinal plants is limited. However, the available data suggests that the cultivation of medicinal plants can be more profitable for farmers than the cash crops being grown currently. In the following table, the comparative costs for cultivation and incomes from kutki (*Picrorhiza Kurrooa*) and traditional cash crops of farmers in Uttarakhand are shown. These figures clearly highlight the economic advantages of the cultivation of medicinal plants.

Table-I

**Comparative cost-benefit analysis (per acre) of traditional cash crops (potato, rajma) and Kutki cultivation (after three years production) at Gheshe (Uttaranchal)**

	Crop	Cost of cultivation (in Rs)	Market price (Rs / kg)	Yield	Gross income (Rs)	Net profit (Rs)
1.	Potato	Seed cost 1,800 Labour cost 3,600 Manure cost 3,000 Maintenance cost 1,500 Transport cost 22,500 <b>Total cost 32,400</b>	5	90 qts	45,000	12,600
2.	Rajma	Seed cost 1,875 Labour cost 3,000 Manure cost 3,000 Maintenance cost 1,500 Transport cost 300 <b>Total cost 9,675</b>	25	6 qts	15,000	5,325
3.	Kutki	Seed cost 2,591 Field preparation cost 8,000 Manure cost 4,500 Maintenance cost 5,000 Harvesting/packing 1,000 Transport cost 1,125 <b>Total cost 22,216</b>	250	4.42 qts	110,500	88,284

**Notes:**

1. Kutki calculations as per Nautiyal et al ( 2001) while taking the present market rate of Rs 250/kg. Data for potato and Rajma are on the basis of a socio-economic survey done by HAPPRC.
2. Kukti data are from low altitude area and from a few farmers only, who have widely differing results. The figures given here are the averages.

*Source: Nautiyal M. C and B. P. Nautiyal, "Collaboration Between Farmers, Research Institutions and Industry: Experiences of Picrorhiza Kurrooa Cultivation at Gheshe Village in Chamoli District, Uttaranchal", Paper presented at Expert Consultation on Medicinal Plants: Strengthening the Sector in Uttaranchal, October 30-31, 2003, Dehradun, Uttaranchal*

**Both the Central and State governments have policies to promote the cultivation of medicinal plants. However, in spite of the importance given to it, only a small amount of medicinal plants' cultivation is taking place in India.**

The information published by the National Medicinal Plant Board also shows comparatively high rate of profitability. For example, the expenditure and returns on the cultivation of kuth (*Sassurea costus*) and Sarpagandha (*Rauwolfia serpentina*) are reported to be Rs. 14,000 and Rs. 45,000 per hectare respectively. The farmers can expect to earn about Rs. 31,000 per hectare from the cultivation of these species.<sup>38</sup>

Both the Central and State governments have policies to promote the cultivation of medicinal plants. However, in spite of the importance given to it, only a small amount of medicinal plants' cultivation is taking place in India. Out of more than 400 major plant species used for the production of medicine by the Indian herbal industry, fewer than 20 species are currently under cultivation in different parts of the country.<sup>39</sup>

The situation is no different in the Himalayan states under consideration.

*There is no large-scale cultivation of medicinal plants in the states under study and both the number of farmers and the size of cultivation are small.*

Our research shows that there is no large-scale cultivation of medicinal plants in these states, and both the number of farmers and the size of cultivation are small. For example, in the Chamoli and Pithoragarh districts of Uttaranchal, cultivation was found to be restricted to a few villages in the Niti and Johar valleys. Even in these places cultivation is being carried out on small plots near the farmers' houses. The size of these plots ranges between 2-4 nalis only. This is the general pattern in the area.

There are a number of reasons that prevent farmers from undertaking the cultivation of medicinal plants. These include the following:<sup>40</sup>

## 1. Economic Factors

**a) High Risk.** Farmers interested in the cultivation of medicinal plants face a number of risks. The technologies for the cultivation of these plants are yet to be tried on a large scale, and their success is yet to be proven. As the farmers do not have experience of these techniques, they face risks concerning both the quantity and quality of production. Also, the demand for and prices of medicinal plants experience a large degree of fluctuation, thereby increasing farmers' risk.

*The technologies for the cultivation of medicinal plants are yet to be tried on a large scale, and their success is yet to be proven. As the farmers do not have experience of these techniques, they face risks concerning both the quantity and quality of production.*

Most farmers report that due to the high risk involved, they are reluctant to convert large parts of their land to medicinal plants. The tendency is either to convert a small area or use fallow land. For example, research shows that the size of plots on which medicinal plants are cultivated in the Johar valley ranges between 2-4 nalis only. As a majority of farmers in the mountain areas have small land-holdings, they are averse to converting large portions to medicinal plants.

**b) Long Gestation Period.** Many medicinal plants can be harvested only after three years or more. This is particularly true of the high value plants grown in high altitude areas. Most farmers are not prepared to wait such a long time for returns. While some of the plants grown in low altitude have low gestation period, they fetch low price in the market.

*Most of the high value medicinal plants grown in high altitude areas can be harvested only after three years or more.*

**c) Low Prices.** Many farmers feel that the prices they receive do not compensate for the difficulties and uncertainties involved in the cultivation of medicinal plants. The prices are low for two important reasons. Firstly, the low cost of collection (both legal and illegal) puts a downward pressure on the price, making cultivation unattractive. Secondly, the primary producers have comparatively low bargaining power.

*The low cost of collection (both legal and illegal) puts a downward pressure on the price, making cultivation unattractive. The primary producers also have comparatively low bargaining power.*

Although accurate information on the cost of cultivation is not available, there is a general feeling that it is higher than the cost of collection. Cultivation requires land, labour, planting material and other inputs. Also, the returns from cultivation in many cases are available only after 3-4 years. On the other hand, the cost of collection mainly constitutes of labour and the returns are available within a few months. Secondly, as the cultivation of medicinal plants is a comparatively new activity, the yields are low. Therefore, as long as large-scale collection continues and improved cultivation technologies are not transferred to farmers, the latter may be reluctant to undertake the cultivation of medicinal plants.<sup>41</sup>

*As long as large-scale collection continues and improved cultivation technologies are not transferred to farmers, the latter may be reluctant to undertake the cultivation of medicinal plants.*

Increased competition from imports has also led to a decline of prices. With the increased liberalisation of import policies, the import of medicinal plants has increased significantly.<sup>42</sup> In many instances, this has resulted in the lowering of prices to such an extent that local cultivation has become economically non-viable. For example, the cultivation of Kala Zira (Carum



*In many instances, increased competition from imports has also resulted in the lowering of prices to such an extent that local cultivation has become economically non-viable.*

*Systematic cultivation of many medicinal plants needs species-specific cultural practices and agronomical requirements dependent on soil, water and climatic conditions.*

*It would be better if the research efforts on medicinal plants were coordinated by one agency, with close collaboration among the research institutes.*

*There is very little on-farm research and farmers' participation in the research process is negligible.*

*The research institutes do not have the resources and experience to undertake a large-scale diffusion of technologies and this gap needs to be filled.*

carvi) has been seriously affected by its imports in large quantities from China. The price has come down from Rs 230/kg in 2000 to Rs150/kg in 2003. Many farmers in Johar Valley of Uttaranchal, who grew kala zira on large scale in the past, have stopped its cultivation.

## **2. Lack of Technological Support**

Systematic cultivation of many medicinal plants needs specific cultural practices and agronomical requirements.<sup>43</sup> These are species-specific and are dependent on soil, water and climatic conditions. Hence research and development work has to be done to formulate good agricultural practices which will include appropriate selection and identification, propagation methods, cultivation techniques, harvesting, stepwise quality control of raw material up to the processing stage, post-harvest treatment, storage and safety.

Farmers face serious difficulties, as they have no experience in cultivating medicinal plants. There is a clear need for the development of technologies related to cultivation, harvesting, storage, transportation and quality control. Although many research institutes are doing research on medicinal plants, their work has contributed little to farmers. This is for a number of reasons:

1. Sub-optimal use of resources. The resources available for research on medicinal plants are distributed too thinly, as research is being done on a large number of species. This creates a situation where none of the research work has sufficient resources to achieve success. In order to use resources efficiently, it is important that research is focused on fewer species than now. The efficiency of research has also been reduced by lack of collaboration between the various research institutes. It would be better if the research efforts were coordinated by one agency, with close collaboration among the research institutes.
2. Research efforts are focused on the development of cultivation technologies. Problems relating to packaging, storage, transportation and quality control are largely neglected. As these processes are vitally important for achieving high quality, greater efforts are needed to solve these problems.
3. The linkages between institutes and farmers are weak. Most of the research is being done in laboratories. There is very little on-farm research and farmers' participation in the research process is negligible. This has a number of implications. These include: (a) the problems faced by farmers are not fully reflected in research efforts; (b) researchers are unable to take advantage of farmers' experience;<sup>44</sup> (c) as farmers are not involved in the research process, diffusion of technology is hampered.

The research institutes do not have the resources and experience to undertake a large-scale diffusion of technologies. This gap needs to be filled. Institutes also lack resources to train farmers. Only a few efforts to train farmers have been made. There is also some doubt as to whether the research institutes have sufficient farm experience to train farmers.

4. The linkages between research institutes and industry are weak. Barring a few exceptions, there is no collaboration between research institutes and industry. There is a general lack of appreciation of the advantages of collaboration. The industry is reluctant to support research, as it is not sure of the commercial returns. The research



*Barring a few exceptions, there is no collaboration between research institutes and industry.*

*Farmers have complained that the planting material provided by governmental agencies is often of poor quality. To improve the situation private sector needs to be involved in the production and marketing of planting material.*

*The number of actors in the supply chain is large including primary collectors and producers, local contractors, local middlemen, regional wholesale markets etc.*

*The collectors and farmers are completely dependent on local traders for the marketing of their products. As there are no open trading facilities (such as mandis) for medicinal plants.*

*As the traders play a crucial role in the smooth functioning of the supply chain, it is unlikely that direct selling to industry could become a practical option.*

priorities of institutes are still largely dictated by academic compulsions and the pressure of peer groups..

5. Research suggests that there is a serious shortage of planting material to set up cultivation in large areas. Farmers have also complained that the planting material provided by governmental agencies is often of poor quality. In fact, many of them have lost interest in growing medicinal plants as they had been given poor material in the past. To improve the situation private sector needs to be involved in the production and marketing of planting material.
6. Presently, the focus of research activities is to develop cultivation technologies for threatened species. The choice of species is not based on the availability of technology and market. It would be better if species with greater economic relevance for a large number of farmers were also covered by research programmes. Also, research to develop methods of sustainable collection needs to be given greater importance.

### **3. Supply Chain and Market Related Problems**

The number of actors in the supply chain is large. These include: primary collectors and producers, local contractors, local middlemen, regional wholesale markets, markets in large centres such as Delhi, Calcutta and Amritsar and specialized suppliers. In almost all cases, the primary collectors and producers sell to local contractors and middlemen. As they are tied to these agents through debts and other obligations, their bargaining power is negligible. Also, as they have only small amounts to sell, they do not have the option of selling directly to wholesalers.

The marketing of medicinal plants by farmers is one of the central problems. The collectors and farmers are completely dependent on local traders for the marketing of their products. As there are no open trading facilities (such as mandis) for medicinal plants, the market is controlled by a handful of traders in the wholesale centres. None of these centres has more than 6-7 traders. This provides them with marked opportunity to fix prices<sup>45</sup>.

Primary producers also suffer from the fact that reliable information on demand and prices is not available. Considering that governmental agencies and research institutes have little contact with the industry, this is not surprising. It was found that in many instances prevailing market prices were lower than those indicated by official agencies. Furthermore, the official estimates do not take into account large fluctuations in demand.

A survey conducted in 1997 points out the difference between what the herb gatherers get and the processed material's worth. One kg of solanum xanthocarpum (kateli) fetches the gatherer Rs 1.5, the wholesaler Rs 7 and the exporter Rs 15. The price of the final product that is derived from one kg of the material is worth Rs 1,200.<sup>46</sup>

Direct selling to industry by groups of farmers is sometimes suggested as one way of reducing the control of contractors and traders. However, as the traders play a crucial role in the smooth functioning of the supply chain, it is unlikely that direct selling to industry could become a practical option.

Here comes up the issue of buy back arrangements wherein corporate and large trading companies enter into arrangements with farmers to supply crucial farm and management inputs and buy-back the produce, making it advantageous both for the producer as well as the industry. In the states

*Buy back arrangements imply that corporate and large trading companies enter into arrangements with farmers to supply crucial farm and management inputs and buy-back the produce, making it advantageous both for the producer as well as the industry.*

under study, government is also directly involved in such system and encourages organic cultivation of medicinal plants. It has been suggested that buy-back arrangements between farmers and large user companies could effect increased farmers' earnings and reduce their risk. Our study of the supply chain suggests that the current system of purchase is ideally suited to meeting the industry's requirements.<sup>47</sup> It is unlikely this will be changed in favour of direct purchase from farmers. Firms require many varieties of raw material, often as many as three to four hundred. An important consideration of their policy is to rationalise purchasing by buying from a limited number of suppliers and large wholesalers. Companies would find it near impossible to acquire everything they need directly from farmers. However, there could be a role for buy back arrangements with large traders and exporters.

*Contract farming and buy-back arrangements provide the only practical alternatives to exporters whose customers require traceability.*

Large traders may be interested in offering buy-back arrangements for species which are difficult to obtain, whose supply fluctuates or when an arrangement at a lower than market price can be made. Large exporters may also find buy-back arrangements attractive in the future, as the requirement of traceability will become increasingly important. At present it is impossible to trace the origin of any material, as there is little transparency and documentation. Contract farming and buy-back arrangements provide the only practical alternatives to exporters whose customers require traceability. However, as it is still possible to export without traceability, the full impact of this trend is yet to be felt in India.

#### **4. Government Policies**

*The governments in the Himalayan states have introduced polices both to conserve resources in situ and to promote cultivation by farmers to counter the rapid depletion of medicinal plants, caused by their large scale collection from the wild.*

The governments in the Himalayan states are seriously concerned about the rapid depletion of medicinal plants, caused by their large scale collection from the wild. They have introduced polices both to conserve resources in situ and to promote cultivation by farmers. In order to check unsustainable and illegal collection, the institutions and mechanisms involved in the collection of medicinal plants from the wild are being reorganised. Most states have also established State Medicinal Plant Boards. These Boards are responsible for coordinating various activities to promote the development of the medicinal plant sector.<sup>48</sup>

In spite of various measures introduced in the past, government policies have met with little success in reducing collection from the wild and promoting cultivation. As the problem of depletion has continued to worsen, there have been efforts to introduce new measures.

*The new policy measures include giving greater responsibility to the Forest Departments both to control collection from the wild and to undertake the marketing of material.*

The new policy measures include giving greater responsibility to the Forest Departments both to control collection from the wild and to undertake the marketing of material. For example, until recently the Bhaishaj Sangh (medicinal plants cooperative) was solely responsible for overseeing the collection of medicinal plants in Uttaranchal. It was said that the contractors mostly controlled the Sangh, and that they misused it by undertaking excessive and illegal collection. It was also used to collect species whose collection was restricted by the Forest Department of Uttaranchal. The Forest Department will now have greater control over the collection and marketing of medicinal plants in Uttaranchal.

In Himachal Pradesh, policy includes measures to involve local people and give powers to panchayats to issue permits to trade, including export and to species that are not banned. The government hopes that these will enforce the traditional rights of the local communities and check indiscriminate exploitation of medicinal plants by traders. The Forest

*In Himachal Pradesh, policy includes measures to involve local people and give powers to panchayats to issue permits to trade, including export and to species that are not banned.*

Department will continue to regulate the collection and transit of endangered species. Out of the 53 species widely used for medicinal and aromatic purposes, the panchayats are allowed to give permits for the trade of 31 species. Export through the panchayats of the remaining 22 species, including the 17 that are endangered will not be allowed. The Divisional Forest Officer will be responsible for granting permission to export these plants. Even in the case of the 31 species, the Forest Department can prevent their collection and trade if it is felt that there has been excessive exploitation.<sup>49</sup>

*In addition to preventing excessive collection from the wild, the governments of Uttarakhand, Himachal Pradesh and Arunachal Pradesh have introduced concrete policies to promote cultivation.*

In addition to preventing excessive collection from the wild, the governments of Uttarakhand, Himachal Pradesh and Arunachal Pradesh have introduced concrete policies to promote cultivation. These policies are being promoted through various government departments, such as the Horticulture Department, Forest Department, Department of Rural Development and Research Institutes. The measures to promote cultivation include:

- a) Strengthen research and development activities
- b) Providing subsidies and financial support for the purchase of planting material, land improvement and cultivation of medicinal plant
- c) Promotional activities to familiarise farmers with the potential of medicinal plants as cash crops
- d) Training of farmers to familiarize them with cultivation and post-harvesting technologies
- e) Development and diffusion of cultivation and other technologies
- f) Setting up of nurseries and other facilities to propagate and deliver planting material to farmers

*Uttarakhand government has recently given a number of government farms to private companies, research institutes and NGOs to carry out large-scale cultivation of medicinal plants.*

The Uttarakhand government has taken a number of initiatives in recent months to promote the cultivation of medicinal plants. For example, it has strengthened the Herbal Research Development Institute to coordinate various activities concerning medicinal plants in the state. The Institute will act as the nodal agency for the promotion of the cultivation of medicinal plants. The government is also making efforts to involve the private sector and non government organisations (NGOs) in promotion activities. It has recently given a number of government farms to private companies, research institutes and NGOs to carry out large-scale cultivation of medicinal plants. It also plans to take steps to increase the availability of technology and planting materials to farmers. There is emphasis on an extensive increase in the number of nurseries, in order to meet the expected growth in demand for planting material.

*The Himachal state government has started promoting ex-situ conservation like the setting up of a number of herbal gardens in the state.*

The Himachal state government has also initiated a number of measures to promote the cultivation of medicinal plants. These include ex-situ conservation like the setting up of a number of herbal gardens in the state. These gardens (called "vanaspati vanas") will be set up with support from the Union Health Ministry and will cost more than Rs 8 crore.<sup>50</sup> In addition to ex-situ conservation, the gardens will be used to give training to farmers in the growing of medicinal plants as cash crops on their land holdings. Herbal gardens are planned in Jogindernagar, Neri in Hamirpur district, Sarivase in Rohru sub-division of Shimla district and Batsari in the Sangla valley of Kinnaur district.<sup>51</sup>

In addition to the government agencies, research institutes are also engaged in the promotion of cultivation in Himachal Pradesh and also carry out studies to determine the suitability of various cultivation methods. A workshop was held by the G B Pant Institute to examine the cultivation of endangered medicinal plants in Himachal Pradesh.<sup>52</sup> It identified a number of species for various regions of the state depending on the climate suitable

*To examine the cultivation of endangered medicinal plants in Himachal Pradesh, a number of species for various regions of the state has been identified depending on the climate suitable for cultivation.*

*In Arunachal Pradesh, the government has schemes to train farmers in the cultivation of medicinal plants which are being run in collaboration with NGOs.*

*In addition to state level research institutes, a number of national institutes also work on the promotion of medicinal plant cultivation in the Himalayan states.*

*The governments of the states under study have introduced policies to promote both conservation and cultivation. But the problem of poor implementation continues to be a major bottleneck.*

for cultivation. These include: *Nardostachys Jatamansi* for cold deserts, *Valeriana Jatamansi* for mid altitude, *Rauwolfia Serpentina* for lower altitude and *Picrorhiza Kurrooa* and *Aconitum Heterophyllum* for high altitude.<sup>53</sup>

In Arunachal Pradesh, the government has schemes to train farmers in the cultivation of medicinal plants. These schemes are being run in collaboration with NGOs. The State Medicinal Plant Board, which is the coordinating body, has also produced a number of books on the cultivation technology of economically important medicinal plants. The State Forest Research Institute is also involved in the promotion of medicinal plants in Arunachal Pradesh. As a result of these efforts, by 2003, about 225 farmers have shown interest in growing medicinal plants<sup>54</sup>. Of these, 47 are registered with the State Medicinal Plant Board. The state has also 28 registered traders in medicinal plants.<sup>55</sup>

In addition to state level research institutes, a number of national institutes also work on the promotion of medicinal plant cultivation in the Himalayan states. These include institutes belonging to the Council of Scientific and Industrial Research (CSIR), the Indian Council of Agricultural Research (ICAR) and the Ministry of Environment. The important institutes include: Regional Research Laboratories (RRL), Jorhat, GB Pant Institute of Himalayan Environment and Development, Kosi and Srinagar (Uttaranchal), G.B.Pant Institute of Himalayan Environment and Development, Mohal-Kullu (Himachal Pradesh)

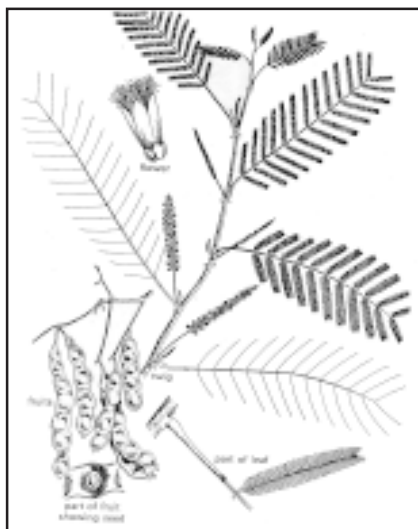
The state governments under the study have selected a number of medicinal plant species which are being promoted for cultivation. The promotional policies are not specific to individual species but apply to all these species. The list of these species is given in the table (*next page*).

It is clear that the Himalayan states under consideration are aware of the importance of medicinal plants and the need to promote their conservation and cultivation. They are also concerned about the large-scale collection from the wild, which has already exposed some species to the threat of extinction. The governments of these states have introduced policies to promote both conservation and cultivation. However, the policies have met with little success. While a number of banned species continue to be collected from the wild illegally, their cultivation has failed to become popular. Some changes in policy are being considered to meet this challenge, but the problem of poor implementation continues to be a major bottleneck. Unless the process of policy implementation is improved, it is doubtful whether the new measures will be successful.

Table-II Species Being Promoted by State Governments	
State	Species being promoted for cultivation
Arunachal Pradesh	Aconitum heterophyllum Coptis teeta Picrorhiza kurrooa Rauvolfia serpentina Taxus wallichiana
Himachal Pradesh	Aconitum heterophyllum Acorus calamus Angelica glauca Berberis aristata Nardostrachys jatamansi Picorhiza kurroor
Meghalaya	Cinchona ledgeriana Rauvolfia serpentina Solanum khasianum Swertia chirata Taxus wallichiana
Uttaranchal	Aconitum heterophyllum Coptis teeta Dactylorhiza hatagirea Nardostrachys jatamansi Picrorhiza kurrooa Podophyllum hexandrum Raulfia serpentina Saussurea costus Swartia chirata Taxus wallichiana

## Database of Medicinal Plant of Arunachal Pradesh, Himachal Pradesh, Meghalaya and Uttaranchal

### 1. *Acacia catechu*



Family: Mimosaceae

Common name: Kaith

Plant parts used-Bark, Heartwood

Medicinal properties /Uses-

1. Melancholia
2. Conjunctivitis
3. Haemophilia
4. Bitter
5. Astringent
6. Acrid
7. Cooling
8. Depurative
9. Antiseptic
10. Digestive
11. Appetiser

Cultivated or not-wild

Extent of availability - Not Endangered

Red Data Book: Not Listed

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 37/Kg

Found in states: All Himalayan States

Distribution: Native to India, Myanmar, Sri Lanka & East Africa.  
Common in Indian forests up to an elevation of 1,500 m.





## 2. *Aconitum heterophyllum*

Family: Ranunculaceae  
Common name: Atis

Plant parts used- Root, Tubers, Seeds

Medicinal properties / Uses-

1. Antiperiodic
2. Anodyne
3. Antidiabetic
4. Antipyretic in very small doses.
5. Narcotic
6. Powerful sedative.

Cultivated / Wild - Both

Estimated Domestic Demand (2004-05): 448.4 tonnes per annum

Market price: Rs. 1209 /Kg

Extent of availability - Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh.

Distribution: Common in the sub alpine and alpine zones of Himalayas at altitudes between 1,800 - 4,500.



## 3. *Acorus calamus*

Family: Alliaceae/Araceae

Common name-Gurbach/Gurbaj

Plant parts used- Rhizomes

Medicinal properties / Uses

- |                |                        |
|----------------|------------------------|
| 1. Bitter      | 6. Diuretic            |
| 2. Acrid       | 7. Intellect promoting |
| 3. Thermogenic | 8. Aromatic            |
| 4. Emmenagogue | 9. Expectorant         |
| 5. Alexeteric  |                        |

Estimated Domestic Demand (2004-05): NA

Market price- Rs. 30 /Kg

Cultivated / Wild -Both

Extent of availability - Not Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh

Distribution: Found throughout the Indian Himalayas up to 6000 m and in Srilanka



#### 4. *Allium sativum*

Family: Alliaceae/Araceae  
Common name: Jimbu pharan

Plant part used - Root

Medicinal properties / Uses

1. Hysteria
2. Flatulence
3. Sciatica
4. Heart disease
5. Facial paralysis
6. Hemiplegia

Cultivated / Wild -Cultivated

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 32 /kg

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh

Distribution: Cultivated all over the Himalayas as important species or condiment crop.

Plant part used- Root



#### 5. *Angelica glauca*

Family: Apiaceae  
Common name: Gandrayani

Plant parts used - Root

Medical properties / Uses

1. Dysentery
2. Constipation
3. Stimulant.

Cultivated / Wild- Both

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 120 /Kg

Extent of availability- Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Himachal Pradesh.

Distribution: Found in Western Himalayas up to 2,700- 3000m.



## 6. *Aconitum ferox*

Family: Ranunculaceae  
Common Name: Bach

Plant part used - Root

Medicinal properties / Uses

1. Narcotic sedative
2. Fever
3. Leprosy
4. Cholera
5. Rheumatism

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 110/Kg

Cultivated / Wild -Wild

Extent of availability- Endangered

Red Data Book: Listed

Found in which states: Uttaranchal, Himachal Pradesh.

Distribution: Common in sub-alpine and alpine zones of Himalayas up to 3,600 m, rare and poisonous species found in northern Himalayas of Nepal and Kashmir.



## 7. *Asparagus racemosus*

Family: Asparagaceae  
Common name: Shatavar

Plant part used-Root

Medicinal properties / Uses

1. Antiseptic
2. Dysentery
4. Diuretic

Cultivated / Wild - Both

Estimated Domestic Demand (2004-05): 16658.5 tonnes per annum

Market price: Rs. 30 /Kg

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Arunachal Pradesh, Meghalaya.

Distribution: Throughout Tropical Asia, Africa and Australia. Common in India, in areas up to 1,400 m elevation.



## 8. *Azadirachta indica*

Family: Meliaceae  
Common name: Neem

Plant Part Used- Bark, Leaves, Flower, Seeds, and Oil

Medicinal properties / Uses-

- |                 |                  |
|-----------------|------------------|
| 1. Bitter       | 7. Liver tonic   |
| 2. Astringent   | 8. Expectorat    |
| 3. Depurative   | 9. Acrid         |
| 4. Vulnerary    | 10. Antiseptic   |
| 5. Demulcent    | 11. Skin disease |
| 6. Insecticidal | 12. Leucoderma   |

Estimated Domestic Demand (2004-05): NA

Market price: N. A

Cultivated / Wild- Wild

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Himachal Pradesh, Arunachal Pradesh, Meghalaya.

Distribution: Native to India and Sri Lanka. Found throughout India, in deciduous forests and also under cultivation.



## 9. *Berberis aristata*

Family: Berberidaceae  
Common name: Daruhaldi

Plant parts used - Root

Medicinal properties/ Uses

1. Antipyretic
2. Antiperiodic
3. Diaphoretic
4. Tonic

Estimated Domestic Demand (2004-05): 1829.4 tonnes per annum

Market price: Rs.10 /Kg

Cultivated / Wild -Wild

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Arunachal Pradesh, Himachal Pradesh, Meghalaya.

Distribution: India (Himalayas and Nilgiri hills) and Srilanka.



## 10. *Bergenia ligulata*

Family: Saxifragaceae

Common name-Pashan Bhed

Plant parts used-Root, Leaf

Medicinal properties / Uses-

1. Fever
2. Pulmonary affections
3. Dysentery
4. Anti-inflammatory
5. Anti-diuretic effect in lower doses
6. Eye disease
7. Cut and burns

Cultivated / Wild- Wild.

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 25 /Kg

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Arunachal Pradesh, Meghalaya, Himachal Pradesh.

Distribution: Found throughout Himalayas from Kashmir to Bhutan and Khasi Hills of Assam



## 11. *Carum carvi*

Family: Apiaceae

Common name: Kala jeera

Plant parts used - Fruit

Medicinal properties / Uses-

1. Stomach.
2. Carminative
3. Lactating

Cultivated / Wild- Both

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 635 /Kg

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Himachal Pradesh, Meghalaya, Arunachal Pradesh.

Distribution: Native to Europe, North Africa and Asia, cultivated in the hills and plains of North India and hills of South India.



## 12. *Cinchona ledgeriana*

Common name:- Quinine  
Family: Rubiaceae

Plant part used- Bark

Medicinal properties-

1. Bitter
2. Reduces fever
3. Antimalarial
4. Tonic
5. Stimulates the appetite
6. Antispasmodic
7. Astringent
8. Antibacterial

Estimated Domestic Demand (2004-05): NA

Market price: NA

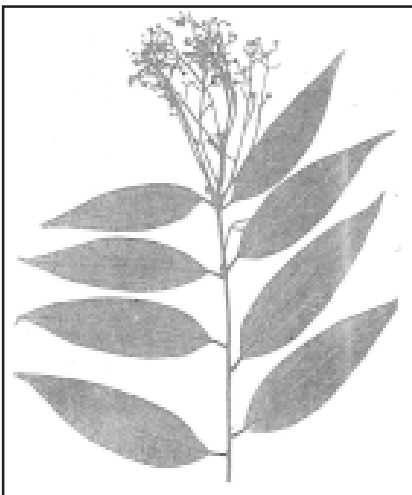
Cultivated or wild- Cultivated

Extent of availability- not endangered

Red data book: not listed

Found in state: Meghalaya

Distribution: Native to mountainous tropical regions of South America, especially Peru, now cultivated in India, Java & parts of Africa



## 13. *Cinnamomum tamla*

Family: Lauraceae  
Common name: Tejpat

Plant parts used-Leaves

Medicinal properties /Uses-

1. Carminative
2. Stimulant
3. Condiment

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 26 /Kg

Cultivated / Wild- Both

Extent of availability-Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Himachal Pradesh, Arunachal Pradesh, Meghalaya.

Distribution: Himalayas at 900-2,400 m elevation





#### 14. *Coptis teeta*

Common name: Mamira  
Family: Ranunculaceae

Plant parts used: Root, Seed, Flower

Medicinal properties / Uses -

- |                                |                  |
|--------------------------------|------------------|
| 1. Tonic                       | 7. Astringent    |
| 2. Stomach medicine            | 8. Emetic        |
| 3. Convalescence after fever   | 9. Cathartic     |
| 4. Other debilitating diseases | 10. Anathematic  |
| 5. Atonics dyspepsia           | 11. Insecticidal |
| 6. Bitter                      |                  |

Cultivated / Wild- Wild

Estimated Domestic Demand (2004-05): NA

Market price: NA

Extent of availability - Endangered

Red Data Book: Not Listed

Found in states: Meghalaya, Arunachal Pradesh.

Distribution: East Asia-North China and temperate regions of Himalayas.



#### 15. *Dactylorhiza hatagirea*

Family: Orchidaceae  
Common name: Salam Panja

Plant parts used-Bulbous roots

Medicinal Properties /Uses-

1. General Tonic
2. Aphrodisiac

Cultivated or not-cultivated (Trials)

Extent of availability - Endangered

Red Data Book - Listed

Estimated Domestic Demand (2004-05): NA

Market price: NA

Found in states: Uttaranchal, Himachal Pradesh, Arunachal Pradesh, Meghalaya.

Distribution: Distributed in the alpine regions of the Himalayas at altitudes between 2500-3500 mt.



## 16. *Datura alba*

Family: Solanaceae  
Common Name: Datura kala

Plant parts used-Root

Medicinal properties /Uses-

- |                                      |  |
|--------------------------------------|--|
| 1. Chronic smoker's cough.           | 5. Nodes                               |
| 2. Rheumatic swelling of the joints. | 6. Glandular inflammation such as mums |
| 3. Lumbago                           | 7. Relieving pain                      |
| 4. painful tumors                    |  |

Cultivated / Wild- Wild

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 74 /Kg

Red data Book- Not Listed

Extent of availability-Not Endangered.

Found in states: Uttaranchal, Himachal Pradesh, Meghalaya, Arunachal Pradesh

Distribution: Grows commonly in waste places throughout India from Kashmir to Malabar



## 17. *Gloriosa superba*

Family: Liliaceae  
Common name- Kalihari

Plant parts used - Seeds, Leaves

Medicinal properties /Uses

1. Athelmintic for cattle
2. Tonic
3. Promotion of labour pain.

Estimated Domestic Demand (2004-05): 100.5 tonnes per annum

Market price: NA

Cultivated / Wild- Wild

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Himachal Pradesh

Distribution: Native to Africa and India.



### 18. *Nardostachys jatamansi*

Family: Valerianaceae  
Common name: Jatamansi

Plant parts uses - Root, Rhizome

Medicinal properties /Uses

1. Tonic
2. Stimulant
3. Palpitation of heart
4. Intestinal tonic.

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 185 /Kg

Cultivated / Wild- Both

Extent of availability - Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh, Arunachal Pradesh, Meghalaya.

Distribution: Grows at heights up to 5,000 m in Eastern Himalayas, in Nepal, Bhutan and Sikkim.



### 19. *Orchis latifolia*

Family: Orchidaceae  
Common name: Salampanja

Plant parts used - Root, Tuber.

Medicinal properties /Uses

Astringent

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 110 /Kg

Cultivated / Wild-Wild

Extent of availability - Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh.

Distribution: Found throughout Western Himalaya to Central Himalaya in India, Afghanistan, North Africa Europe & North Asia.



## 20. *Origanum vulgare*

Family: Lamiaceae/Labiatae  
Common name: Vantulsi

Plant parts used - Leaves, Stem

Medicinal properties /Uses

1. Mint
2. Volatile oil used as aromatic stimulant in rheumatism.

Cultivated / Wild-Wild

Estimated Domestic Demand (2004-05): 5402.9 tonnes per annum

Market price: NA

Extent of availability - Not Endangered

Red Data Book: Not Listed

Found in states: Uttaranchal, Himachal Pradesh

Distribution: Native to Europe, naturalized in the Middle East



## 21. *Picrorhiza kurrooa*

Family: Scrophulariaceae  
Common name: Kutki

Plant parts used - Root

Medicinal properties / Uses-

1. Stomach pain
2. Fever
3. Dyspepsia

Estimated Domestic Demand (2004-05): 317.0 tonnes per annum

Market price: Rs. 143 /Kg

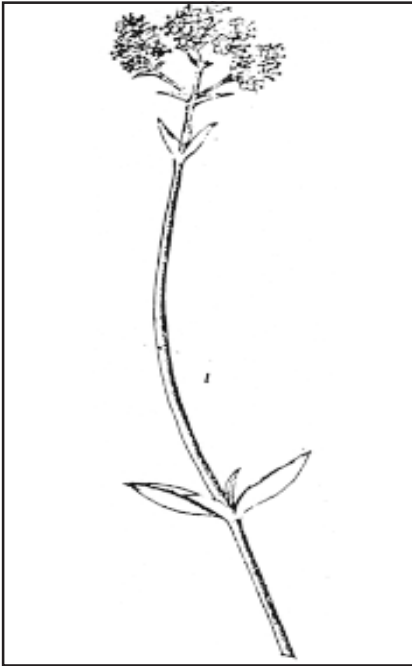
Cultivated / Wild- Both

Extent of availability-Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh.

Distribution: Native to Mountains of India, Nepal and Tibet. Distributed in Himalayas from Kashmir to Sikkim at an elevation of 2,700-4,500m



## 22. Piper longum

Family: Piperaceae  
Common name: Pipli

Plant parts used - Flower

Medicinal properties / Uses

1. Stimulant
2. Carminative
3. Tonic
4. Cough
5. For preparation of Astakatvara taila

Estimated Domestic Demand (2004-05): 6280.4 tonnes per annum

Market price: Rs. 78 /Kg

Cultivated / Wild-Wild

Extent of availability - Endangered

Red Data Book: Listed

Distribution: Origin in South Asian (Dekkan Peninsular)

## 23. Plantago ovata



Family: Plantaginaceae  
Common name: Isabgol

Plant parts used - Leaves

Medicinal properties /Uses

- |                        |                            |
|------------------------|----------------------------|
| 1. Catarrh             | 5. Gonorrhoea              |
| 2. Blenorrhoea         | 6. Dysentery and diarrhoea |
| 3. Affection of kidney | 7. Cough and colds         |
| 4. Adherent            |                            |

Estimated Domestic Demand (2004-05): NA

Market price: N.A

Cultivated / Wild: Cultivated

Extent of availability- Not Endangered

Red Data Book: Not listed

Found in states: Himachal Pradesh

Distribution: Widely distributed between South Mediterranean and East Asia.



## 24. *Podophyllum hexendrum*

Family: Podophyllaceae  
Common name: Bankakri

Plant parts used - Rhizome, Root.

Medicinal Properties / Uses

1. Cure for tumors
2. Purative
3. Skin disease
4. Bitter tonic
5. Emetic

Estimated Domestic Demand (2004-05): NA

Market price - NA

Cultivated / Wild: Wild

Extent of availability-Endangered

Red Data Boo: Listed

Found in states: Uttaranchal, Arunachal Pradesh, Meghalaya, and Himachal Pradesh.

Distribution: Throughout the Himalayas from Afganistan to China



## 25. *Polygonatum verticillatum*

Family: Liliaceae  
Common name: Salam mishri

Plant parts used - Root, Stock

Medicinal Properties / Uses

- |   |                        |
|---|------------------------|
| 1. Diuretic                             | 5. Appetiser and tonic |
| 2. Emollient                            | 6. Glactagogue         |
| 3. Aphrodisiac                          | 7. Fever               |
| 4. Vitiated condition of pitta and vata | 8. Weakness            |

Estimated Domestic Demand (2004-05): NA

Market price- Rs. 4.51 /Kg

Cultivated / Wild-Wild

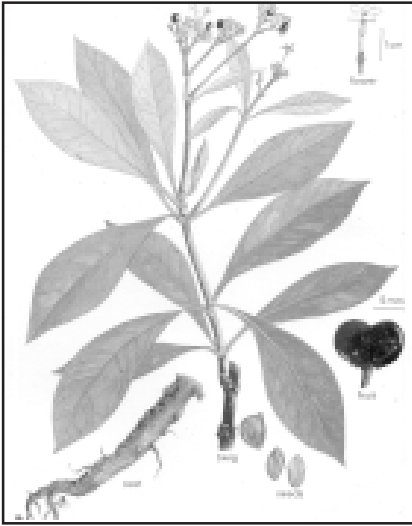
Extent of availability - Not Endangered

Red Data book: Not listed

Found in states: Himachal Pradesh, Uttaranchal, Meghalaya, Arunachal Pradesh

Distribution: Found in Himalayas at height of 1,800 to 3,900m





## 26. Rauwolfia serpentina

Family: Apocynaceae  
Common name: Sarpagandha

Plant parts used - Root, Leaves

Medicinal Properties / Uses

1. Reduces blood pressure
2. Remedy in painful affection
3. Uterine contraction
4. Removal of opacities of eye cornea.

Estimated Domestic Demand (2004-05): 588.7 tonnes per annum

Market price- Rs. 155 /Kg

Cultivated / Wild- Both

Extent of availability - Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh, Meghalaya, Arunachal Pradesh

Distribution: Native to much of Southern and south Eastern Asia including India, Malaysia and Indonesia. Found in sub-Himalayan tracts from Sirhind eastwards to Assam, Sikkim.



## 27. Rheum emodi

Family: Polygonaceae  
Common name: Dolu

Plant parts used - Rhizome, Root

Medicinal properties / Uses

1. Tonic
2. Astringent
3. Purgative

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 56 /Kg

Cultivated / Wild - Wild

Extent of availability - Not Endangered

Red Data Book: Not listed

Found in states: Uttaranchal, Arunachal Pradesh, Meghalaya, Himachal Pradesh

Distribution: Native from Indian Himalayas, distributed in the Himalayas from Kashmir to Sikkim at altitudes of 3,300-5,200 m



## 28. *Rubia cordifolia*

Family: Rubiaceae  
Common name: Majis

Plant parts used-Root, Fruit

Medicinal properties-Uses

- |              |                               |
|--------------|-------------------------------|
| 1. Diuretic  | 4. Discolouration of the skin |
| 2. Paralysis | 5. Reduce inflammations.      |
| 3. Dropsy    |                               |

Estimated Domestic Demand (2004-05): NA

Market price-Rs. 60 /Kg

Cultivated / Wild -Wild

Extent of availability- Not Endangered

Red Data Book: Not listed

Found in states: Uttaranchal, Himachal Pradesh, Meghalaya, and Arunachal Pradesh.

Distribution: Throughout India in hilly districts up to 3,750 m (foothills of western and central Himalaya)

## 29. *Saussurea costus*



Family: Asteraceae  
Common name: kuth

Plant parts used-Root

Medicinal properties-Uses

- |                     |              |
|---------------------|--------------|
| 1. Antispasmodic    | 7. Cholera   |
| 2. Aphrodisiac      | 8. Dyspepsia |
| 3. Bronchodilator   | 9. Gas       |
| 4. Antiseptic       | 10. Jaundice |
| 5. Skin             | 11. Leprosy  |
| 6. Bronchial asthma | 12. Tonic    |

Estimated Domestic Demand (2004-05): 1826.3 tonnes per annum

Market price: Rs. 95/kg

Cultivated / Wild -cultivated

Extent of availability- Endangered

Red Data Book: Listed

Found in states: Uttaranchal, Himachal Pradesh, Meghalaya, and Arunachal Pradesh.

Distribution: In Moist slopes of the Himalayas at altitudes between 8000 to 12000 ft.



### 30. *Solanum khasianum/viarum*

Common name: Ban-bhindi, Kandiyari, kantkari, Bari-kandiyari  
Family: Solanaceae

Plant part used - Fruit

Medicinal properties:

1. Influences central nervous system.
2. Its solasodine used in various formulations.

Estimated Domestic Demand (2004-05): NA

Market price: NA

Cultivated or not- cultivated

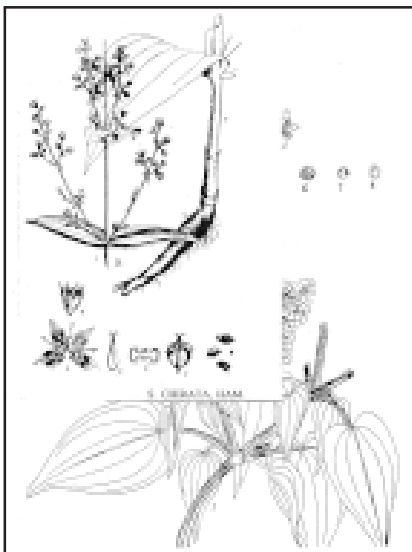
Extent of availability - Not Endangered

Red data book: Not Listed

Found in state: Meghalaya

Distribution: In North East Himalayas of India.

### 31. *Swertia chirata*



Family: Gentianaceae  
Common name- Chirayata

Plant parts used- whole plant

Medicinal properties-Uses

1. Bitter tonic
2. Stomach

Estimated Domestic Demand (2004-05): 1284.7 tonnes per annum

Market price: Rs. 280/kg

Cultivated / Wild - Wild

Extent of availability - Endangered

Red Data Book - Listed

Found in states: Arunachal Pradesh, Himachal Pradesh, Meghalaya

Distribution: indigenous to temperate Himalayas from Kashmir, Nepal, Bhutan . Also found in deciduous forests of West Bengal, central & south India up to 1,200m.



### 32. *Taxus wallichiana*

Family: Pinaceae  
Common name: Himalayan Yew

Plant parts used - Bark, leaves

Medicinal properties /Uses-

1. Taxol extracted from the leaves and bark is used to treat breast and uterine cancer.
2. In Ayurveda and Tibetan medicine it is used to treat fever and muscular pain.

Cultivated or not - cultivated

Extent of availability - Endangered

Red Data Book - Listed

Estimated Domestic Demand (2004-05): NA

Market price: NA

Found in states: Uttaranchal, Himachal Pradesh, Arunachal Pradesh, Meghalaya.

Distribution: In Asia, from Afghanistan to Philippines.



### 33. *Tinospora cordifolia*

Family: Menispermaceae  
Common name: Gurjar Gudchi

Plant parts used - Stem, Root

Medicinal properties: Uses

- |                              |                 |
|------------------------------|-----------------|
| 1. Bitter stomach ache       | 6. Diuretic     |
| 2. Stimulates bile secretion | 7. Skin disease |
| 3. Tonic                     | 8. Diabetes     |
| 4. Fever                     | 9. Antidote     |
| 5. Vomiting                  |                 |

Cultivated / Wild -Wild

Red Data Book: Not listed

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 10/kg

Found in states: Uttaranchal, Himachal Pradesh

Distribution: Distributed throughout India



### 34. *Valeriana wallichii*

Family: Valerianaceae

Common name-Samewa sugadh

Plant parts used- Root

Medicinal properties / Uses

- |                           |                      |
|---------------------------|----------------------|
| 1. Alexiteric             | 8. Ant periodic      |
| 2. Cures epileptic fits   | 9. Hypnotic          |
| 3. Head troubles          | 10. Aphrodisiac      |
| 4. Disease of eye         | 11. Pain in joint    |
| 5. Blood disease          | 12. Disease of liver |
| 6. Suppression of urine   | 13. Clear the voice  |
| 7. Astringent carminative |                      |

Cultivated / Wild - Wild

Estimated Domestic Demand (2004-05): NA

Market price: Rs. 90 /kg

Extent of availability - Not Endangered

Red Data Book - Not listed

Found in states- Uttaranchal, Himachal Pradesh

Distribution- Distributed in Himalayas up to 3,000 m. -



### 35. *Withania somnifera*

Family: Solanaceae

Common name: Ashwagandha

Plant parts used-Root, Leaves, Fruit and Seed

Medicinal properties / Uses

1. Aphrodis tonic
2. Rheumatism
3. Consumption
4. Debility in old age
5. Coagulating milk

Market price: Rs. 92 /Kg

Estimated Domestic Demand (2004-05): 9127.5 tonnes per annum

Cultivated / Wild - Cultivated

Extent of availability-Not Endangered

Red Data Book- Not listed

Found in states: Uttaranchal, Himachal Pradesh.

Distribution: Distributed throughout drier parts of India.

## Conclusions and Recommendations

### Conclusions

Medicinal plants are important for a number of reasons. A large proportion of India's rural population depends on these plants for their health care needs. They also provide the basic raw material for the production of traditional medicines. Finally, the collection and processing of medicinal plants provide employment and income opportunities for a large number of people in rural areas. As a large variety of medicinal plants are found in the Himalayan region, they play a substantial role in the lives of local communities.

A majority of medicinal plants are collected from the wild. With the large increase in domestic and international demand, there has been a sharp increase in collection. This has put extreme pressure on wild resources, and many species face threat of extinction. All the states included in the study face this problem.

This study highlights a number of reasons for the excessive and illegal collection of medicinal plants from the wild. These include the involvement of contractors and sub-contractors, whose main interest is to maximize profit. They do this by collecting larger amounts than permitted, and by collecting species whose collection is forbidden. The enforcement of regulations by the Forest Department and other governmental agencies is also lax. This enables the contractors to carry out both illegal and excessive collection.

The governments in these states are becoming increasingly aware of the need to conserve medicinal plants. They have taken a number of initiatives to conserve endangered species in the wild. However, these efforts have not shown the desired results. While governments are planning to introduce new initiatives, the implementation of policies continues to be poor. Unless policies are fully implemented at the local level, there is little chance that things will improve significantly.

In addition to conservation, the governments' policies promote the cultivation of medicinal plants. Again, these policies have met with little success. Very few farmers in these states are engaged in the commercial cultivation of medicinal plants. There are a number of reasons for this: the difficulty in the cultivation of high altitude species, a lack of cultivation technologies, a shortage of planting material, long gestation periods and uncertain demand. While governments have taken some steps to remove these bottlenecks, their results are yet to be seen. Our study shows that these efforts are spread too thinly and have not resulted in a significant improvement in the situation.

It is important that government policies and their implementation should be improved, so that the potential of medicinal plants is fully utilized without endangering the rich biodiversity of the Himalayan states. Based on our study, the following recommendations are being made:



## Recommendations

1. The policies pertaining to the collection of medicinal plants, and their implementation, should be made transparent. The performance of government agencies, such as the Forest Department, which regulate the collection and transportation of collected material, needs to be improved. Unless these agencies carry out their work honestly, it will be difficult to prevent excessive and illegal collection from the wild.
2. In order to conserve the traditional knowledge, measures to popularize the indigenous systems of medicine, based on local plants, should be taken. The state governments should increase their efforts to increase awareness of the importance of medicinal plants. They should also increase the resources spent on providing health care based on these systems. This, and not an emphasis on exports, will provide impetus to the sustainable growth of the sector.
3. The local communities should be given greater role in the conservation activities. The lessons learnt from the experience of joint forest management (JFM) should be used to increase the effective participation of local people.
4. In order to conserve the rich biodiversity of the Himalayan region, measures such as the preparation of comprehensive biodiversity register should be considered. Furthermore, in case of commercial use of medicinal plants and local knowledge by the drug industry, steps should be taken to ensure benefit sharing with local communities.
5. Farmers wishing to cultivate medicinal plants face a number of difficulties. The steps taken by the state governments to remove these difficulties have not been adequate. The resources devoted to the development and diffusion of cultivation technologies need to be augmented. Similarly, efforts to produce planting material needs to be increased.
6. Facilities to store medicinal plants at road-heads need to be established. Processing facilities at important collection and cultivation points should also be built so that the value of the material and earnings of local farmers and collectors are increased.
7. There is a need to provide the farmers with better marketing facilities. It is important that innovative marketing mechanisms are instituted so that farmers' risk is reduced and their income is increased. The role of NGOs in the marketing of medicinal plants should be expanded. Furthermore, marketing by farmers' associations and cooperatives need to be promoted.
8. In order to reduce farmers' risk, insurance schemes should be introduced.
9. The choice of species which are to be promoted for cultivation should take into account the availability of technology and economic potential. The choice should not be based solely on the criterion of conservation.
10. There is a serious shortage of reliable information pertaining to prices and the size of the demand for various species. Government agencies and NGOs working on medicinal plants should make efforts to bridge this gap.
11. The conservation of medicinal plants, and the interests of local community are threatened by biopiracy and illegal patents. Some of the rules of WTO encourage these tendencies. It is important that the government and civil society take steps to make local communities aware of these dangers. These incidences can be checked only when

the local communities are aware of the danger and have close links with agencies whose job is to prevent biopiracy and illegal patenting.

12. The Civil Society has a central role to play in strengthening the medicinal plant sector. The government agencies should introduce policies which encourage and facilitate this role.
13. Finally, the conservation of medicinal plants is a national issue. The Central government should provide greater financial and technical support to state governments to promote conservation and cultivation of these plants.

## Endnote

1. Pei Shengji. (2001).
2. Factors contributing to the growth in demand for traditional medicine include the increasing human population and the frequently inadequate provision of Western (allopathic) medicine in developing countries.
3. Kate Ten, K. & Laird, S. A. (1999).
4. Farnsworth, N.R. and D.D. Soejarto (1991).
5. Subrat, N. (2002).
6. Subrat, N. (2002).
7. CRPA (2000).
8. Schippmann, U., Leaman, D. J. & Cunningham, A. B. (2002).
9. Lange, D. (2000).
10. Anonymous (1996).
11. Lange, D. (2000), op.cit.
12. <http://nmpb.nic.in/introduction.htm>
13. Parrotta John A (2002).
14. For example, in South Africa 99 percent of the medicinal plants are harvested from wild sources. In Germany this proportion varies between 70-90 percent. See: Cunningham, A.B (1991).
15. Parrotta John A (2002), op.cit.
16. International Union for Conservation of Nature and Natural Resources; see: <http://www.redlist.org/>
17. Farnsworth, N.R. and D.D. Soejarto (1991)
18. Hersch-Martínez, P (1995).
19. In many areas this knowledge is rapidly disappearing. This is particularly damaging to communities living in mountains and tribal areas, as their dependence on traditional systems of medicine is large.
20. Subedi, B. (2002)
21. Hamilton Alan (2003)
22. Schippmann, U., Leaman, D. J. & Cunningham, A. B. (2002).
23. Heywood, V. (2000).
24. Lange, D. (1998).
25. India 2000.
26. The Indian Himalayan region has a total of 1,748 species.
27. Nuatiyal S, et. al (1998)
28. India (2000), op.cit.
29. Down To Earth, Vol 9, No 17 January 31, 2001, <http://www.cseindia.org/html>
30. Incidentally, medicinal plants play an equally important role in other developing economies. For example, between 50-100 percent of rural households in the northern part of central Nepal are estimated to be involved in collecting medicinal plants for sale. The money earned from the collection of these plants accounts for between 15-30 percent of the total income of poorer households. See: Olsen, C. S. (1997)

31. Information given at <http://www.indiatogether.org/environment/articles/ghnp/park.htm>
32. Information given at <http://www.indiatogether.org/environment/articles/ghnppark.htm>
33. Maikhuri, R.K., S. Nautiyal, K.S. Rao, and K.G. Saxena (1996)
34. Uniyal et al. 2000.
35. *ibid.*
36. Regmi S. & Bista, S. (2002).
37. Airi, s, R.S.awat, U.Dhar and A.N.Purohit (2000).
38. It must, however, be mentioned that these figures are based on field trials and demonstration plots. As large scale cultivation of these species is yet to take place, data from farmers' fields is not available. The actual returns on farmers' fields are likely to lower.
39. Uniyal et al. 2000.
40. This section is largely based on Alam Ghayur and John Belt (20003)
41. It is sometime argued that industry will pay premium prices for cultivated material as its quantity and quality can be better controlled. The study did not find any evidence to support this premise. It appears that the trade is well organised and the industry does not face any difficulty in meeting its requirements.
42. Mainly from China and Nepal.
43. See: India (2000)
44. It must, however, be clarified that farmers' experience is largely limited to growing medicinal plants on small plots and kitchen gardens.
45. The illegality of the system strengthens the position of the traders and discourages the development of open and efficient markets.
46. Down To Earth, Vol 9, No 17 January 31, 2001, <http://www.cseindia.org/html>
47. Alam Ghayur and John Belt (20003)
48. Except Meghalaya, all other states under consideration have set up the boards. See: " Shillong Stalls Medicinal Plants Board", The Telegraph, July 30, 2003
49. "Scheme To Export Medicinal Plants", The Tribune , Chandigarh, February 12, 2002
50. Morales Frank (1997)
51. *ibid.*
52. International Workshop on Endangered Medicinal Plant Species in Himachal Pradesh, Organised by G.B.Pant Institute of Himalayan Environment and Development, Mohal-Kullu, 18-19 March 2002.
53. *Ibid.*
54. The following plants are being promoted in Arunachal for cultivation. Acorus, Andrographis , Aquilaria, Dioscorea, Oroxylum, Rauvolfia, Tinospora, Withania, etc in low altitudes. For high altitudes it is Aconitum, Coptis, Gymnadaenia, Illicium, Panax, Picrorrhiza, Rubia, Taxus.
55. Information provided by Dr. B.V.S.Murthy, Member Secretary, State Medicinal Plant Board, Arunachal Pradesh.

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Launched in December 1994 by a consortium of South Asian NGOs, South Asia Watch on Trade, Economics & Environment (SAWTEE) is a recognised, registered, non-profit, non-governmental organisation. It currently operates through its headquarters in Kathmandu and 11 network members from five South Asian countries, namely Bangladesh, India, Nepal, Pakistan and Sri Lanka.

SAWTEE's mission is to build the capacity of the concerned stakeholders in the context of liberalisation and globalisation in South Asia. SAWTEE follows the five-prong strategy to achieve its mission.

- **Networking:** Establishing institutional linkages with various national, regional and international institutions that are working in the areas of liberalisation, globalisation and sustainable development.
- **Capacity building:** Conducting capacity building activities at various levels through training workshop, information dissemination and internship programme.
- **Policy research:** Conducting policy research on issues such as WTO rules, regional cooperation, intellectual property rights, competition policy, environment and development dimension of trade liberalisation.
- **Advocacy:** Organising conferences, seminars, policy dialogues, consultation meetings, talk programmes and interaction programmes. The advocacy at the policy level is also supplemented by publication and distribution of policy briefs and posters on relevant issues in a timely manner.
- **Sensitisation:** Publishing and circulating briefing papers, newsletters, discussion papers, monographs, policy briefs and posters on issues related to globalisation, liberalisation, multilateral trading system, regional cooperation, co-mpetition policy, environment, intellectual property rights, food security etc.

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Established in 1983, Consumer Unity & Trust Society (CUTS) started off as a consumer protection organisation in Rajasthan. Since then it has been working in several areas of public interest at the grassroots, national, subcontinental and international levels.

CUTS launched the CUTS Centre for International Trade, Economics & Environment (CUTS-CITEE) in 1996. Its aim is to become a global standard institution for research and advocacy on trade issues affecting countries in the South. The mission of the Centre is "pursuing economic equity and social justice within and across borders by persuading governments and empowering people." The Centre's goals are as follows:

- Enable, empower and facilitate representatives of the civil society, from developing countries in particular, to analyse, articulate and advocate on emerging and relevant issues in the international trading and economic system at the appropriate fora.
- Create an informed society through empowerment of people and civil society representatives thus enhancing transparency and accountability in the international trading and economic system.
- Promote equity between and among the developed and developing countries through well-argued research and advocacy on issues of international trading and economic system.

In order to attain the above-mentioned goals, the following strategies are followed:

- Conducting research and advocacy on issues of international trade, sustainable development and comparative domestic policies.
- Training and networking with international agencies, NGOs and media.
- Creating dynamic upward and downward linkages between people and policy makers.
- Implement the above under the guidance of an international advisory board of experts.

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