CONSERVATION AND DEVELOPMENT OF MEDICINAL PLANTS
1. INTRODUCTION

1.1 Background

Interest and support for the conservation and development of medicinal plants is increasing in all parts of the world. This is due, in part, to a growing recognition given to the role of medicinal plants in the provision of culturally relevant and affordable health care in creating sustainable livelihoods and in the vital conservation of biodiversity. This has also drawn the attention of the world community towards the need for creating mechanisms to ensure sustained development of the sector and to allow sharing of information between countries, organizations and agencies.

As per World Health Organisation (WHO) estimates, almost 80% of the population of developing countries relies on traditional medicines, mostly plant drugs, for their primary health care needs. In fact it is well known that even in developed countries, the use of traditional medicines is quite prevalent. Also, modern pharmacopoeia still contains at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. Demand for medicinal plants is increasing in both developing and developed countries due to growing recognition of natural products being non-narcotic, having no side-effects, easily available at affordable prices and sometime the only source of health care available to the poor.

In India, Medicinal plants sector has traditionally occupied an important position in the socio cultural, spiritual and medicinal arena of rural and tribal lives. Recognizing its importance, the Government of India established the Department of Indian System of Medicine and Homoeopathy, and more recently the Medicinal Plants Board to develop, promote and regulate the sector for maximizing the benefits to the people as well as to ensure sustainable growth. Medicinal plants have been identified as one of the thrust areas by the Ministry and different programmes have been initiated for conservation of medicinal plants found in the forests and protected areas as well as cultivation of these plants in the degraded forest areas.

Kerala has been at the forefront of ayurvedic revolution in the country, endowed with rich biodiversity because of its natural topography comprising of all three biomes – hills, plateaus and coasts. The state government has established R&D and
educational infrastructure for further developing the science of traditional medicine, and also took the lead in promoting health tourism which has been equally popular among Indian as well as foreign tourists.

1.2 Objectives

In view of the above, this study has been commissioned to assess the feasibility of setting up an Agri Export Zone in Kerala for Medicinal Plants in Kerala.

The specific issues to be covered are:

- World market overview (products, world trade, existing and potential markets, requirements of quality, etc.)
- Overview of the Indian scenario, with specific reference to Kerala
- Backward linkages for export market driven production, pre and post-harvest practices, R&D requirements, etc.
- Analysis of the infrastructure requirement
- Strategies for market penetration & niche marketing
- Constraints and support required

1.3 Methodology

In order to arrive at the most feasible model for Agri Export Zone, the following approach has been adopted:

- Current status of various medicinal plants in India was analyzed to understand the availability (wild as well as cultivated), production capabilities for herbal products, infrastructure available, export volumes, direction of trade, etc.
- A survey was carried out to study the present agronomical practices being adopted by collectors and growers, type of processing facilities and related infrastructure available, etc. This was taken into consideration while working out the concept of Agri Export Zone.
- Discussions were held with exporters and importers of medicinal plants and herbal products, to understand the dynamics of the world market, strengths and weaknesses of Indian produce with respect to the world demand, etc.
- Discussions were also held with eminent scientists in government and research institutions to gather insights into the nature of research projects being
undertaken and technical/financial assistance being provided to farmers for encouraging the production of medicinal plants, both in terms of quantity and quality.

- Secondary Data Research: The secondary data comprising of world trade statistics, trends in trade, development of new varieties, import regulations, quality standards, domestic production etc. were compiled. The data on world trade and India’s production, imports and exports statistics etc. were collected from the libraries of research organizations, institutions, journals, magazines, and internet and through foreign associates.

The consultants have tried to collect latest data from a number of sources, which forms the basis of export targets and strategy to achieve these targets. A list of contacts made during the survey is enclosed at Annexure 1.

1.4 Agri Export Zone Study - The Structure

This Agri Export Zone study report incorporates the findings from the investigations and studies undertaken towards evolving an integrated approach for export promotion of medicinal plants and products from Kerala.

The report essentially deals with four major components, which constitute different sections of the report.

- Firstly, trends in world trade and Indian scenario have been analysed, covering the sources of demand and supply, and prevalent international prices. An in-depth analysis has been undertaken with a view to identify the constraints/weak links in the chain.
- Secondly, export potential has been worked out, based on the analysis of world market and India’s capabilities.
- Thirdly, an action plan has been recommended, outlining steps required to achieve export targets, covering all aspects of growing (pre & post harvest), collection, processing, packaging, storage and transportation etc. in line with the requirements of international markets.
- Lastly, a model of the proposed Agri Export Zone in Kerala has been elaborated including geographical location, various activities, role of various agencies involved, and financial implications thereof.
2.  World Scenario

2.1  Definitions/Nomenclature

Generally the terms “medicinal plants” and “herbs” are used interchangeably. The traditional or popular name of medicinal plants varies from country to region depending on the historical and cultural aspects.

Recognizing these variations, WHO has provided the following definitions for reference only (Methodologies for Research and Evaluation of Herbal Medicines, 2001):

**Herbs** include crude plant material such as leaves, flowers, fruit, seed, stems, wood, bark, roots, rhizomes or other plant parts, which may be entire, fragmented or powdered.

**Herbal materials** include, in addition to herbs, fresh juices, gums, fixed oils, essential oils, resins and dry powders of herbs. These include “processing” by various local procedures such as steaming, roasting, baking with honey or other materials.

**Herbal preparations** are produced from herbal materials by extraction, fractionation, purification, concentration, or other physical or biological processes.

**Finished herbal products** consist of herbal preparations made from one or more herbs.

**Herbal medicines** include herbs, herbal materials, herbal preparations and finished herbal products, used for medicinal purposes. The term *traditional medicine* refers to the traditional use of herbal medicines. Their use is well established and widely acknowledged to be safe and effective, and may be accepted by national authorities.

The definitions in the field of *Traditional medicine*, also referred to as alternative medicine or complementary medicine in some countries, differ from country to country depending upon the regulations in each country.

Based on the above definitions it can be inferred that medicinal plants are in fact herbs, which are used for preparation/formulation of traditional medicinal products. Medicinal plants therefore represent one of the major categories within the herbs/herbal products, the other important categories being health/nutrition supplements,
perfumery/aromatic products and beauty/cosmetic/toiletry products. Accordingly, for the purpose of this report, all information/data about herbs and herbal products has been assumed to be referring to medicinal plants.

2.2 Market Characteristics

It is well established that traditional medicine has been widely used all over the world for centuries. However, the extent and forms have varied. Even in the present context, a majority of the population worldwide, has used traditional medicine at least once, mostly for minor and/or chronic ailments. Although only a few countries officially recognize the traditional forms of medicine, a fairly large percentage of licensed allopathic practitioners, even in developed countries, have incorporated the traditional medicines in their prescriptions. One of the major factors, which may result in an explosive growth of traditional medicine, would be its inclusion under insurance reimbursements.

The prevalence and acceptance of various forms of traditional medicine in various countries, is summarized below:

Table 2.1: Status of traditional medicine in various countries

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>% using traditional medicine</th>
<th>Forms of traditional medicine recognized</th>
<th>Regulatory situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>70-80%</td>
<td>African traditional forms of healing, chiropractic, osteopathy</td>
<td>None in most countries. Some countries such South Africa, Congo, Ethiopia, Zimbabwe etc. have included traditional medicine in legislations governing practice and insurance</td>
</tr>
<tr>
<td>USA</td>
<td>42%</td>
<td>Traditional Native North American medicine, Homeopathy, Acupuncture, Naturopathy, Hypnosis, Biofield therapy</td>
<td>Highly evolved: Regulatory controls cover licensing, scope of practice, malpractice, professional discipline, third party reimbursements and access to treatments</td>
</tr>
<tr>
<td>Canada</td>
<td>70%</td>
<td>Traditional Native North American medicine, Manipulative therapy, Traditional Chinese medicine and Acupuncture, Naturopathy</td>
<td>Coverage by health insurance is selective and minimal. No formal recognition to traditional medicine, only Guidelines for physicians/ practitioners</td>
</tr>
<tr>
<td>France</td>
<td>49%</td>
<td>Homeopathy, acupuncture, water cure, chiropractic, osteopathy, thalasso therapy, iridology</td>
<td>Only licensed allopathic physicians allowed to practice medicine</td>
</tr>
<tr>
<td>Germany</td>
<td>40-50%</td>
<td>Homeopathy, acupuncture, procaine injection therapy, chiropractic, ozone and</td>
<td>Use of traditional medicine allowed only where allopathic treatment is not available or has</td>
</tr>
<tr>
<td>Country</td>
<td>Use</td>
<td>Treatments</td>
<td>Recognized/Regulation</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Italy</td>
<td>24%</td>
<td>Homeopathy, acupuncture, herbal remedies, prana therapy, anthroposophic and chiropractic therapy</td>
<td>Only licensed allopathic physicians allowed to practice medicine. Chiropractic is recognized as a profession.</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Over 50%</td>
<td>Homoeopathy, manipulative medicine, acupuncture, naturopathy</td>
<td>Homeopathic and anthroposophic medicines are reimbursed by insurance</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>12% using and 70% in favour of using</td>
<td>Herbal medicines, osteopathy, homeopathy, acupuncture, hypnotherapy and spiritual healing</td>
<td>Only licensed allopathic physicians are recognized officially.</td>
</tr>
<tr>
<td>India</td>
<td>70% widely used in almost all households</td>
<td>Ayurveda, Unani, Siddha and homeopathy, naturopathy, yoga</td>
<td>All are recognized under the Central Council of Indian Medicine Act.</td>
</tr>
<tr>
<td>Pakistan</td>
<td>70%</td>
<td>Unani, Tibb, Ayurveda and Homoeopathy</td>
<td>Integrated into the national health system</td>
</tr>
<tr>
<td>UAE</td>
<td>Very popular</td>
<td>Herbal preparations and products</td>
<td>Registration criteria for herbal medicines</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>Widely used in almost all households</td>
<td>Acupuncture, herbal/ nutritional/ health food products and homeopathy</td>
<td>All herbal preparations require registration</td>
</tr>
<tr>
<td>China</td>
<td>widely used in almost all households</td>
<td>Chinese traditional medicine</td>
<td>Integrated with the national health care system (equality in policies related to traditional and allopathic medicine)</td>
</tr>
<tr>
<td>Japan</td>
<td>70-75%</td>
<td>Kampo medicine, acupuncture, moxibustion, massage/finger pressure, judo therapy</td>
<td>Only allopathic physicians can practice</td>
</tr>
<tr>
<td>Indonesia/ Malaysia</td>
<td>40%(70% in rural areas)</td>
<td>Siddha, Ayurveda, Unani, acupuncture, massage, spiritual healing</td>
<td>Recognized as an integral part of curative and nursing care</td>
</tr>
<tr>
<td>Korea</td>
<td>Very popular</td>
<td>Oriental medicine, acupuncture, moxibustion, chiropractics</td>
<td>Dual system of medical treatment (oriental and allopathic). Also covered under insurance</td>
</tr>
<tr>
<td>Thailand</td>
<td>Very popular</td>
<td>Herbal medicines, massage, acupuncture, reflexology</td>
<td>Traditional practitioners and Ayurvedic doctors are integrated into the healthcare system</td>
</tr>
<tr>
<td>Australia</td>
<td>48%</td>
<td>Traditional Chinese systems, homeopathy, chiropractic, osteopathy, naturopathy</td>
<td>Only registered allopathic physicians are allowed to practice</td>
</tr>
</tbody>
</table>

Globally, over one and half million practitioners use traditional medicine in preventive/promotive/curative applications.

2.3 World Market for Herbal Products

No specific estimate is available for the global market for medicinal plants—neither individually nor even collectively. Therefore, the same has to be derived from the figures available for broader categories such as herbal products, herbal medicines etc. However, it is pertinent to mention here that even for these categories, the
variance in definitions and interpretations of the terms is reflected in the wide variance seen in market size estimates available from various sources.

An EXIM Bank study on Export Potential of Ayurveda and Siddha Products & Services estimates the global herbal products market at around US $ 62 billion, in 1997, growing at a rate of 10%-15% per annum.

Another estimate puts the global herbal market at almost US$ 120 billion a year (The Week, July 2002) with the share of Ayurveda being almost 50%, i.e. US$60 billion. Assuming that this estimate is for the year 2002, it matches well with the Exim Bank estimate for 1997, taking a compounded annual growth rate of 15%

USA and Europe are the largest markets for herbal products, accounting for nearly two-thirds of the total demand.

2.4 Market Segments

Herbal products can be classified into five strategic areas as under:

- Phyto-Pharmaceuticals: These are drugs containing isolated pure active compounds derived from medicinal plants for treatment of a large number of diseases. In 1997, the global market for Phyto-pharmaceuticals was US$ 10 billion in 1997 and is estimated to have risen to about 13.5 billion by 2002. The projected growth rate is 6.3% per annum.

As per another source, the world market of pharmaceuticals derived from medicinal plants exceeds US$ 20 billion. The sales of medicinal herbs in EU countries amounted about 3% of the total pharmaceuticals market. Details of major consumers of herbal/Phyto pharmaceuticals are USA, Germany and UK.

Further, according to the industry, the world market for herbal drugs/medicines is of the order of US$ 70 billion (Business Line, April 2002). This may be due to the fact that there is a very large unorganized sector, which is not reported in official data.

- Medicinal Botanicals / Botanical Extracts / Herbal or Dietary Supplements: These are whole plants or plant part extracts used for maintenance of health. In 1997, the market for Medicinal Botanicals was estimated at US $ 16.7 billion, with
Europe and North America together accounting for 63% of the world market. The European market for herbal remedies accounts for 45% of the global market, and stood at US$ 7.5 billion in 1997.

Individually, USA is the single largest market (US$ 4 billion) followed by Germany (US$ 3.6 billion). France is the other most established market in Europe, with a share of 11%.

The projected annual growth is estimated at 15-20% for European markets and as high as 10-100% for American markets. Accordingly, the market size in 2002 is estimated to be of the order of US$ 33-35 billion.

**Table 2.2 - Market for Medicinal Botanicals / Botanical Extracts / Herbal or Dietary Supplements 1997**

<table>
<thead>
<tr>
<th></th>
<th>Market (US$ billion)</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>16.5</td>
<td>100</td>
</tr>
<tr>
<td>Europe</td>
<td>7.5</td>
<td>45</td>
</tr>
<tr>
<td>Germany</td>
<td>3.6</td>
<td>22</td>
</tr>
<tr>
<td>France</td>
<td>1.8</td>
<td>11</td>
</tr>
<tr>
<td>Italy</td>
<td>0.8</td>
<td>5</td>
</tr>
<tr>
<td>UK</td>
<td>0.5</td>
<td>3</td>
</tr>
<tr>
<td>Spain</td>
<td>0.3</td>
<td>2</td>
</tr>
<tr>
<td>Holland</td>
<td>0.1</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>0.4</td>
<td>2</td>
</tr>
<tr>
<td>North America</td>
<td>4.0 (3.0)</td>
<td>25 (18)</td>
</tr>
<tr>
<td>Asia</td>
<td>4.0 (3.0)</td>
<td>25 (18)</td>
</tr>
<tr>
<td>Others</td>
<td>1.0 (3.0)</td>
<td>10 (18)</td>
</tr>
</tbody>
</table>

Source – Heritage Healing Vol. 1, No. 7, Sep 1999

Figures in brackets are from another study conducted for RIRDC, Australia, which gives same overall figures but differs in the breakdown.

- **Nutraceuticals**: These are foods containing supplements from natural (botanical) sources that deliver a specific health benefit, including prevention and treatment of diseases. These are gaining popularity in USA and West Europe. The world Nutraceuticals market was approx. US$ 5.5 billion in 1997, of which the market share of Europe was US$ 1.05 billion and that of USA was US$ 3.0 billion. Assuming
A growth rate of 15% per annum, the nutraceuticals market in 2002 is estimated at about US$ 10 billion.

- **Cosmeceuticals**: These are cosmetic products containing biologically active ingredients. Annual market for these products was estimated at about US$ 10.5 billion in 1997 (US$ 2.5 billion in USA and US$ 5 billion in Europe). Based on the overall industry growth rate, the market size in 2002 is estimated to have been around US$ 22-25 billion.

- **Herbal raw material**: This is a very large market but no estimates are available. However, based on the above estimates of various categories, the market for raw herbal products should be about US$ 30 billion.

### 2.5 Production & Exports

China and India are the two largest producers of medicinal plants and account for 40% of global bio-diversity. However, China has established itself as the major exporter of traditional herbal medicines in the world market, with exports to the tune of US$ 5 billion per year, as against US$ around 240 million by India. India needs to organize itself well to achieve a significant share in this growing market segment.

Almost 90% of the collection of medicinal plants is from the wild. Since 70% of plant collections involve destructive harvesting, many plants are endangered or vulnerable and threatened.

### 2.6 International Standards and Regulations

The legal situation regarding herbal preparations varies from country to country. In some countries, phytomedicines are well established, whereas in others they are regarded as food, and therapeutic claims are not allowed.

Developing countries, however, have a large number of traditionally used herbal medicines and tremendous folk knowledge about them, but no significant steps have been taken to establish these traditionally used herbal medicines as part of the drug legislation.
World Health Organisation, Codex Alimentarius and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are the important world bodies for regulating the medicinal plants and herbal products market. In addition, each country/region has its own standards and regulatory regime, as summarized below for EU and USA, the two largest markets. More details are provided in Annexure 2.

EU Market
In order to enter the EU market with pharmaceutical products, companies must apply for registration of their products. This application must be accompanied by documents that provide the results of tests and trials carried out on the product concerned. The application and quality requirements are such that they represent an actual regulatory and technical barrier to entering the EU market. Details are provided in Annexure 2.

USA
The use of herbal medicines in the USA is less widespread because their wider distribution through pharmacies is difficult because no medical benefits can be claimed and consumers are dependent on advice from pharmacists who, in a majority of cases, have little knowledge about medicinal herbs.


The principal goal of the Task Force is to end illegal importation of toxic substances, unapproved drugs posing a risk to the public health, and protected wildlife products. In USA, sales of many Chinese patent medicines have been prohibited due to either labeling which makes unsubstantiated claims or due to the medicines containing illegal or legal western drugs. The Govt. has also prepared a list of restricted and/or prohibited herbal products, including endangered species, controlled substances, and unsafe herbs. Details are provided in Annexure 2.
3. Indian Scenario

3.1 General
India has one of the richest traditional medicine cultures in the world. Nearly 8000 species (accounting for around 50% of all the higher flowering plant species of India - as per Ministry of Environment & Forests, Government of India) have been for long known and used for their medicinal properties. Millions of households, particularly in rural areas, use medicinal plants for self-medication, for preventive, promotive and curative applications.

The Government of India has identified medicinal plants as one of the thrust areas, and various programmes have been initiated for conservation of medicinal plants found in the forests and protected areas as well as cultivation of these plants in the degraded forest areas. Medicinal Plants Conservation Areas (MPCA) have been established in the southern States of Kerala, Tamil Nadu and Karnataka and Medicinal Plants Conservation Network (MPCN) for in-situ conservation.

3.2 Market Size

The domestic market for ayurvedic, herbal and plant based products is estimated to be around Rs. 3000 crores, growing at 15-20% p.a. The share of Ethical formulations is only 20% of the total market, the balance 80% being accounted for by OTC products.

The sales of crude herbal drugs and extracts are of the order of Rs. 350-400 crores. These crude drugs & extracts are used by Pharma industry for production of OTC products, ethical formulations, as well as traditional and home remedies.

As per an earlier Exim Bank study, the sales of medicinal plants in India in 1996-97 were Rs. 300 crores (including the requirements of traditional practitioners- vaidyas, and home remedies), when the total herbal/ayurvedic market was Rs. 2300 crores. Assuming the same ratio, it is estimated that the sales of medicinal plants in 2002 were around Rs. 400 crores.
Manufacture of herbal/ayurvedic products in India is more than a century old. There are estimated to be over 7800 manufacturing units in India, the major players being Kottakal Arya Vaidyashala, Dabur, Himalaya, Zandu and Baidyanath. It is interesting to note that most of these leading producers are not the leading exporters in India, because a significant portion of exports of their products takes place through informal channels, such as users/patients carrying these as part of baggage etc. For example, Kottakal Arya Vaidyashala, one of the oldest institutions of Ayurveda in the world has zero exports officially.

3.3 India’s Share in World Trade

India, at present, exports herbal material and medicines to the tune of Rs. 1210 crores annually (2001-02), comprising Rs. 593 crores from saps and extracts, Rs. 370 crores from plants and plant parts, and Rs. 235 crores from Ayurvedic and Unani medicines.

USA is the single largest export destination for Indian medicinal plants/products, accounting for almost 50% of total exports.

India’s exports to individual EU member countries are small, but as a region the EU represents a sizeable market for India’s exports in the sector.

**Table 3.1: India’s exports of medicinal plants and herbal products**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Description</th>
<th>1998-99</th>
<th>1999-00</th>
<th>2000-01</th>
<th>2001-02</th>
<th>Major destinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1211</td>
<td>Plants and parts of plants (including seeds and fruits), of a kind used primarily in perfumery, pharmacy or for insecticidal, fungicidal or similar purpose, fresh or dried, whether or not cut, crushed or powdered</td>
<td>268.74</td>
<td>191.44</td>
<td>357.45</td>
<td>370.94</td>
<td>USA (177); Japan (26)</td>
</tr>
<tr>
<td>1302</td>
<td>Vegetable saps and extracts; pectic substances, pectinates and pectates; agar-agar and other mucilages and thickeners, whether or not modified, derived from vegetable products</td>
<td>826.79</td>
<td>921.53</td>
<td>698.99</td>
<td>593.18</td>
<td>USA (299)</td>
</tr>
<tr>
<td>30039001</td>
<td>Preparations — Ayurvedic and Unani Medicines</td>
<td>34.76</td>
<td>36.23</td>
<td>96.53</td>
<td>92.26</td>
<td>USA (9.1), Nepal (7.2), Russia (5.7)</td>
</tr>
<tr>
<td>30039002</td>
<td>Preparations — Homeopathic Medicines</td>
<td>0.37</td>
<td>0.67</td>
<td>2.19</td>
<td>2.03</td>
<td>Sri Lanka,</td>
</tr>
</tbody>
</table>
The above export data has been presented in three categories, according to the extent of value addition:

- **Raw form (plants and plant parts):** The important medicinal plant/herbal product exported from India is Isabgol (psyllium husk and seeds) amounting to about Rs. 242.44 crores.

- **Saps and extracts:**
  - **Preparations (medicines):** These are mainly in the form of Ayurvedic and unani medicines. Within this category, the preparations for retail sales are substantially higher than those for industrial end-use.

None of the above high-export items are presently grown in the state of Kerala. Therefore, for the purpose of this report, the relevant export base in 2001-02 was Rs. 323 crores, representing exports of medicinal plants/herbal products which are already being grown or can be grown in Kerala, as shown in table below:

**Table 3.2: India’s exports of medicinal plants and herbal products, which are available in Kerala (Rs. Crores)**

<table>
<thead>
<tr>
<th>Item</th>
<th>1998-99</th>
<th>1999-00</th>
<th>2000-01</th>
<th>2001-02</th>
<th>Major destinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1211 Plants and parts of plants (including seeds and fruits), of a kind used primarily in perfumery, in pharmacy or for insecticidal, fungicidal or similar purpose, fresh or dried, whether or not cut, crushed or powdered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12119043 Gymnema powder</td>
<td>0.78</td>
<td>1.08</td>
<td>1.11</td>
<td>0.48</td>
<td>USA</td>
</tr>
<tr>
<td>12119033 Camboge fruit rind</td>
<td>0</td>
<td>0</td>
<td>0.059</td>
<td>0.04</td>
<td>UAE</td>
</tr>
<tr>
<td>12112003 Galangal rhizomes and roots</td>
<td>0.29</td>
<td>0.75</td>
<td>0.33</td>
<td>0.96</td>
<td>UAE</td>
</tr>
<tr>
<td>12119096 Garcenia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
There was a significant increase of 37% in exports in the year 2000-01, mainly due to increase in exports of value added products, namely Ayurvedic and Unani medicines, for which the exports increased to Rs. 220 crore, a jump of 52% from previous year. This increase has been sustained in the year 2001-02 as well, which is a positive indication that Indian exporters are moving upwards on the value chain. USA, Russia and Nepal are the important markets for these products.

Table 3.3: Exports of Ayurveda & Unani preparations (medicines) from India (Rs. Crores)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>To Russia</th>
<th>To Germany</th>
<th>To USA</th>
<th>To Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-99</td>
<td>130</td>
<td>9</td>
<td>2.7</td>
<td>14.6</td>
<td>.85</td>
</tr>
<tr>
<td>1999-2000</td>
<td>145</td>
<td>16</td>
<td>2.7</td>
<td>15</td>
<td>3.5</td>
</tr>
<tr>
<td>2000-01</td>
<td>220</td>
<td>26</td>
<td>21.7</td>
<td>21.2</td>
<td>8.2</td>
</tr>
<tr>
<td>2001-02</td>
<td>240</td>
<td>23.5</td>
<td></td>
<td>29.7</td>
<td></td>
</tr>
</tbody>
</table>

Note: While exports to Germany and Australia declined in 2001-02, Nepal merged as an important destination with exports worth Rs. 20.3 crores.

Even though Ayurveda is widely recognised as basically an Indian system, novel, safe and economical, Indian products have NOT yet captured the world market.
However, India’s overall export performance with respect to the US market, which has the highest demand for herbal products, has been very encouraging. In 1998, India’s share in US imports of pharmaceutical preparations, was less than 20% of that from China. However, by year 2002, India has increased its exports five-fold to be almost at par with China. Even in the specific case of medicinal plants, India has overtaken China as the leading supplier to USA.

### Table 3.4 - US Import of Pharma preparations (US$ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>From India</th>
<th>From China</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>16980</td>
<td>59.69</td>
<td>305.57</td>
</tr>
<tr>
<td>1999</td>
<td>22510</td>
<td>78.27</td>
<td>376.21</td>
</tr>
<tr>
<td>2000</td>
<td>27810</td>
<td>95.55</td>
<td>386.62</td>
</tr>
<tr>
<td>2001</td>
<td>32700</td>
<td>214.43</td>
<td>295.69</td>
</tr>
<tr>
<td>2002</td>
<td>40550</td>
<td>330.73</td>
<td>331.81</td>
</tr>
</tbody>
</table>

Source: USA Census Bureau

### Table 3.5: US Imports of Medicinal Plants (US$ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>From India</th>
<th>From China</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>133</td>
<td>20.35</td>
<td>45</td>
</tr>
<tr>
<td>2000</td>
<td>132</td>
<td>28.78</td>
<td>39</td>
</tr>
<tr>
<td>2001</td>
<td>137</td>
<td>37.75</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: US Census Bureau

### 3.4 Distribution of Medicinal Plants

Around 70% of India’s medicinal plants are found in tropical areas mostly in the various forest types spread across the Western and Eastern ghats, the Vindhyas, Chotta Nagpur plateau, Aravalis & Himalayas. Although less than 30% of the medicinal plants are found in the temperate and alpine areas and higher altitudes they include species of high medicinal value. Macro studies show that a larger percentage of the known medicinal plants occur in the dry and moist deciduous vegetation as compared to the evergreen or temperate habitats.

One third of these are trees, an equal portion is herbs and the remaining one third are shrubs, grasses and climbers. A very small proportion of the medicinal plants are lower plants like lichens, fens, algae, etc. Majority of the medicinal plant are higher flowering plants.
Over 800 species of medicinal plants are used in production of traditional medicines by industry. Of these about 90% are collected from the wild. **Less than 20 species of plants are under commercial cultivation.** A study by ITCOT has identified the sources of supply for major herbal raw materials required by Indian pharmaceutical industries.

Over 70% of the plant collections involve destructive harvesting because of the use of parts like roots, bark, wood, stem and the whole plant in case of herbs. This poses a definite threat to the genetic stocks and to the diversity of medicinal plants if biodiversity is not sustainably used.

While the demand for medicinal plants is growing, some of them are increasingly being threatened in their natural habitat. For meeting the future needs conservation and cultivation of medicinal plant is being encouraged. However, of more than 400 plant species used for production of medicines by Indian Industry, less than 20 are currently under the cultivation in the country.

**Figure 1 – Break up of medicinal plant by their parts utilised**

### 3.5 Medicinal Plants Resource Base

Current practices of harvesting are unsustainable, resulting in depletion of resource base. Medicinal plants based industries in India also lack a proactive and socially responsible approach, and are therefore partly responsible for inefficient, imperfect, informal and opportunistic marketing of medicinal plants.
The collections in most cases are done by villagers and tribals, without paying attention to the stage of maturity, dried haphazardly and stored for long periods under unsuitable conditions. The quality of collected material, as such is often degraded.

Several medicinal plants have been assessed as endangered, vulnerable and threatened due to over harvesting or unskillful harvesting in the wild. The Government of India has put 29 species in the negative list of export.

The other main source of medicinal plant is from cultivation, which is considered more appropriate for use in the production of drugs. Given the higher cost of cultivated material, cultivation is often done under contract. In the majority of cases, companies cultivate only those plant species, which they use in large quantity or in the production of derivatives and isolates, for which standardisation is essential and quality is critical. More recently growers have set up cooperatives or collaborative ventures in an attempt to improve their negotiating power and achieve higher price.

3.6 Trade in Medicinal Plants

Usually the dried parts of medicinal plants (roots, stem wood, bark, leaves, flowers seeds, fruits, and whole plants etc.) are used as raw materials for the production of traditional remedies of Ayurveda, Siddha, Unani, Homeopathy, Tibetan and other systems of medicine including the folk, ethno or tribal medicines. These are also used to obtain therapeutically active chemical constituents, using specialised processes of extraction, isolation, fractionation and purification and are used as phytochemicals for the production of modern allopathic medicines or herbal/phytomedicines.

There is a vast, secretive and largely unregulated trade in medicinal plants, mainly from the wild, which continues to grow dramatically in the absence of serious policy enforcement and/or environmental planning. A study by Kerala Forest Research Institute found that most (57%) of the non-timber forest products (NTFP) in Kerala are used by the tribals as ingredients for ayurvedic medicines. For example the Thrissur market for medicinal plants has been a major supplier of raw materials to large
number of ayurvedic drug manufacturers, including the big companies, even though most of the transactions are illegal. **Illegal trade not only denies the revenue earnings to the state government, but also acts as a serious disincentive for any efforts towards organised cultivation and conservation.**

### 3.7 Value Added Products From Medicinal Plants

The medicines for internal use prepared in the traditional manner involve simple methods such as hot- or cold-water extraction, extraction of juice after crushing, powdering of dried material, formulation of powder into pastes using water, oil or honey, and even fermentation after adding a sugar source.

Traditionally, the herbal medicines were produced manually in small quantities, by the practitioner him/herself who was able to identify the correct plant species. However, with the introduction of commercial production of herbal drugs, while the processing efficiencies have improved considerably, it has also introduced an element of doubt about the authenticity and quality of plant material used. Therefore, there is a need to select proper and appropriate technologies for the industrial production of traditional medicines such that the effectiveness of the preparation is maintained.

The value added herbal products can be classified into following groups:

- Extracts/concentrates (particularly in the form of retail packaging such as capsules)
- Preparations (mixed formulations)

Some Indian companies like Ranbaxy Labs, Parry Nutraceuticals, Dr. Morepen etc. are developing vitalisers, geriatric tonics, cycle correctives for women, growth promoters for children, digestives, liver tonics and laxatives, besides working on anti-diabetes, anti-inflammatory/anti-arthritis, cardio-vascular, CNS, dermatology, respiratory and urology segments.
3.8 Policy & Institutional infrastructure

3.8.1 Department of Indian System of Medicine and Homoeopathy (ISM&H)
The Government of India established the ISM&H, under the Ministry of Health and Family welfare in 1995, with the objective of rendering simple and effective remedies to people, particularly in the area of preventive health, maintaining healthy lifestyle, alleviating discomfort caused by specific diseases and treating chronic diseases. Activities of the ISM&H include:

- Upgrading educational standards in ISM&H
- Strengthening existing research and ensuring time bound research programmes in ISM&H
- Drawing up and administering schemes for promotion, cultivation and regeneration of medicinal plants
- Evolving pharmacological standards for ISM&H

3.8.2 National Medicinal Plants Board
Set up recently at national level under the Ministry of Health & Family Welfare, the National Medicinal Plants Board is mandated to enhance the availability of quality raw material for domestic consumption and to enhance exports of medicinal plants. Some of the activities undertaken by the Board are:

- Making concerted efforts to cover all related aspects including conservation, cultivation, processing and marketing
- Coordination of all matters related to medicinal plants in India.
- Conduct general and specialized surveys of the international markets for medicinal plants and products so as to identify niche areas.
- Registration of cultivators, farmers and traders
- Simplification of transit permits/legal procurement certificates for raw drugs
- R&D activities in areas of post-harvest management, shelf life, storage and agrotechniques
- Constitution of State Medicinal Board in each state/UT. Till date 13 State Boards have already started functioning, including in Kerala.
3.8.3 Traditional Knowledge Digital Library (TKDL)

TKDL is being created under the guidance of the National Institute of Science Communication (NISCOM); to serve the objective of making available ON-LINE non-patent database pertaining to traditional knowledge of uses of medicinal plants/medicinal plant based products/formulations.

Its main activities shall be to:

★ Integrate the widely scattered references on India’s traditional systems in a retrievable form.
★ Act as an abridge between traditional and modern systems of medicine.
★ Provide a major impetus to research in ISM&H

3.8.4 Infrastructure

There are about 2189 hospitals and approx. 15,000 dispensaries providing ayurvedic and other traditional medical services. Overall there are nearly 500,000 registered practitioners of Ayurveda, Unani, siddha and naturopathy streams of traditional medicine, and 200,000 practitioners of homeopathy.

In terms of educational institutions, there around 200 under-graduate teaching institutions, 53 upgraded post-graduate institutions and 16 offering postgraduate specializations.

3.9 Indian standards

3.9.1 Pharmacopoeia standards

The Ministry of Health and Family Welfare has taken up the task of developing Pharmacopoeia standards, both for single as well as compound drugs, through Pharmacopoeia Committees. Pharmacopoeia standards are mandatory for the drug testing provisions under the Drugs and Cosmetic Act, 1940. These standards are also used for checking samples of drugs available in the market for their safety and efficacy.

3.9.2 Quality Standards for Medicinal Plants

The Medicinal Plants Unit of Indian Council for Medical Research has announced that it would be shortly releasing Quality Standards for 32 Indian Medicinal Plants, based on research conducted at four national research institutions. These standards will provide guidelines for herbal drugs manufacturers, practitioners, academicians, researchers as well as regulatory bodies.
3.9.3 Good Manufacturing Practices (GMPs)

The Indian System of Medicine has adopted the GMPs with effect from June 2000 for herbal products manufacturing units, with the objective of ensuring quality assurance covering all aspects of the manufacturing system. GMPs were formulated initially in a WHO report on specifications for pharmaceutical preparations. These have been expanded/elaborated from time to time. In the present form, the GMPs lay down specific requirements for various aspects such as location, surroundings, factory premises, buildings, water supply, disposal of waste, storage area, machinery and equipment, health and hygiene of workers, documentation and records, and quality control system.

The manufacturing unit is issued a GMP certificate, valid for 2 years, after proper inspection of the premises.

3.10 Schemes/Incentives for Promotion of Traditional Medicine

3.10.1 Ministry of Health & Family Welfare
• Schemes of National Medicinal Plants Board (NMPB)

NMPB has several promotional and commercial schemes for providing technical and financial assistance to government organizations, NGOs, R&D institutions, industrial units, associations of growers/traders etc., as summarized in Annexure 3. In addition, financial assistance provided to individual farmers is summarized in the table below:

Table 3.6: NMPB Financial Assistance available to farmers

<table>
<thead>
<tr>
<th>Type of beneficiary</th>
<th>Extent of assistance available (% of total expenditure / Amount)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small &amp; marginal (operational land area &lt;2 ha.)</td>
<td>50%</td>
</tr>
<tr>
<td>Medium (operational land area 2-10 ha.)</td>
<td>40%</td>
</tr>
<tr>
<td>Large (operational land area &gt;10 ha.)</td>
<td>30%</td>
</tr>
<tr>
<td>NGOs, Societies/ Cooperatives</td>
<td>30%</td>
</tr>
<tr>
<td>Technology transfer &amp; development of identified medicinal plant</td>
<td>Rs. 10 Lakhs per year</td>
</tr>
<tr>
<td>Pilot project for commercial Production of quality planting material</td>
<td>Rs. 10 Lakhs per year</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Rs. 25 Lakhs</td>
</tr>
<tr>
<td>In-situ conservation &amp; Ex-situ cultivation</td>
<td>Rs. 10 Lakhs per year</td>
</tr>
<tr>
<td>Training/workshop/seminars</td>
<td></td>
</tr>
<tr>
<td>• At state level</td>
<td>Rs. 2 Lakhs</td>
</tr>
<tr>
<td>• At regional level</td>
<td>Rs. 3 Lakhs</td>
</tr>
<tr>
<td>• At national level</td>
<td>Rs. 5 Lakhs</td>
</tr>
<tr>
<td>Type of beneficiary</td>
<td>Extent of assistance available (% of total expenditure / Amount)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>• At international level</td>
<td>Rs. 10 Lakhs</td>
</tr>
<tr>
<td>Market information service including data bank</td>
<td>Rs. 10 Lakhs</td>
</tr>
<tr>
<td>Award to Medicinal plant scholars</td>
<td>Rs. 1.5 Lakhs per year @ Rs. 15,000 per &quot;Vanaushadhi Pandit&quot;</td>
</tr>
</tbody>
</table>

- **Schemes of Department of Indian System of Medicine and Homoeopathy (ISM&H)** - details in Annexure 3

3.10.2 Ministry of Environment & Forests

National Parks and Sanctuaries Scheme for promotion of in situ conservation of medicinal plants

Funding of Ethnobiological studies for compiling information on status of tribal communities and the wild plants used by the tribal communities as food, fodder, medicinal uses etc.

- **NAEB’s Scheme on Non-Timber Forest Produce including Medicinal Plants** for promoting afforestation, tree planting, ecological restoration and eco-development activities in the country.

In addition to the above specific schemes for medicinal plants, other incentives/schemes offered by National Horticulture Board (Ministry of Agriculture) and APEDA (Ministry of Commerce) are also available for medicinal plants as well.
4. Medicinal Plants in Kerala

4.1 Unique Features

Some features that make Kerala an ideal place for the growth of traditional medicine, particularly the Ayurvedic system, are:

- Kerala is host to one of the largest number of quality treatment centres and the largest number of treatment methodologies. Almost all the hotels and resorts in the state have Ayurveda centres, run by authentic and traditional Ayurveda institutions, making “health tourism” a unique selling proposition for the state.
- Kerala has the largest pool of qualified and committed Ayurveda doctors and experienced therapists.
- Kerala has all the three kinds of biomes, namely hills, plateaus and coasts, making it a biodiversity hotspot having a rich source of medicinal plants. Almost 70% of the herbal plants used in the formulation of Ayurvedic remedies are native to Kerala.
- India’s premier learning institutions imparting Ayurvedic education are in Kerala.
- Most manufacturers and practitioners of Ayurveda in the state follow the traditional and authentic form of the system, strictly adhering to regimens prescribed in the classical texts.
- Kerala has proven expertise in the practice of the Ashtanga pradhan (all the eight divisions of Ayurveda) in its most comprehensive form as well as the panchakarma treatment.
- The state has the distinction of making independent treatment contributions in the form of the very popular Navarakizhi and Thakradhara.
- Kerala has developed the expertise for preparation of unique oils for external applications such as Mukkoottu and Kuzhambu.

4.2 Evolution of Ayurveda in Kerala

The popularity of Ayurveda in Kerala follows from the Aryan invasion. Vagbhadan, the master of Ayurveda, is reported to have come to Kerala to start his own style of treatment and practice. He wrote two books on Ayurveda while he was in Kerala, namely Ashtaangabridayam and Ashtaangasamgrabam. His disciples from eight families, who later came to be known as the Ashtavaidyan (eight doctors), propagated Ayurvedic treatment in the land. Seven of the Ashtavaidya families still exist.
The tropical system of Ayurveda practiced in Kerala is perceptibly different from the general practice of Ayurveda elsewhere, reflecting the societal culture in Kerala, which are a little different from other societies in India. The very popular and effective panchakarma therapy is based on the belief that even the minutest passages/channels in the body need to be cleansed on a routine basis, through five-fold purification system (hence the name). Comprising of Therapeutic Vomiting (Vamana), Purgation Therapy (virechana), Enema Therapy (Basti), Nasal Administration (Nasya) and Purification of the blood (Rakta moksha).

### 4.2.1 Educational infrastructure in Kerala

There are about 113 Ayurvedic hospitals and 679 dispensaries with 2604 beds in Kerala. There are five Ayurveda colleges in the state, of which three are in the Government sector and two are in the private sector. Ayurvedic research centres have been set up in Thiruvananthapuram, Thrissur, Cheruthuruthi and Kottakkal, Government Ayurveda hospitals and dispensaries. The private Ayurveda School started by Pameswaran Moothathu was taken over by the Government and later developed into a college. The courses offered in these colleges include Vaidyashastri, Vaidya Kalandhi, D.I.M. course, D.A.M course (diploma), B.A.M. (degree) etc.

### 4.2.2 Research and Other Infrastructure in Kerala

The Kerala Institute for Research, Training & Development of Scheduled Castes and Scheduled Tribes (KIRTADS), whose objective is upliftment and protection of diminishing art forms, symbols and culture, conducts research and training in traditional knowledge systems. The institute has recently signed an MoU with the Regional Research Laboratory, Thiruvananthapuram. KIRTADS also applies for patenting tribal medicinal knowledge. In fact, one of its patents on anti-diabetic medicine has been accepted by the Patent office in New Delhi. The organization has identified 85 medicinal tribal healers. KIRTADS has been trying to get a legislation enacted to safeguard tribal intellectual property right on medicinal knowledge. The organization focuses on chronic diseases and case like asthma, psoriasis, rheumatoid arthritis etc. KIRTADS has also conducted two camps in New Delhi with the India International Trade Fair.
4.2.3 Marketing of Medicinal Plants in Kerala

In Kerala the marketing of major Non Wood Forest Produce (NWFP)-largely medicinal plants- is undertaken in an organized manner by the Kerala State Federation of Scheduled Caste and Scheduled Tribes Development Co-operatives Limited. The Federation markets the medicinal produce of 34 tribal cooperative societies spread over different districts in the state, through its four branches, located in Thiruvananthapuram, Adimali, Thrissur and Kalpetta districts.

Besides the Federation, marketing is also done by private traders, and the collectors themselves.

Every year, the Minor Forest Products Committee allots forest areas to different tribal societies for the collection of NWEP. To facilitate collection, societies establish collection depots inside the forests during the peak collection season, managed by agents/depot managers who are mainly tribal. When adequate quantities have been collected from the different depots, auction notices are sent by the Federation to all the parties evincing interest in the auction.

Another marketing practice adopted by the Federation is direct negotiation. This is resorted to for sales of Sida bombifolia, Desmodium gangeticum, Psendartbria viscida and Nilgiriantbus ciliatus. These plants are needed in the raw form and cannot be stored for long periods. Therefore, the Federation enters into an agreement with the parties interested in purchasing these items and supplies them at a mutually agreed price.

Inadequate storage facilities and lack of funds during the peak collection season are the two major hurdles that impede the smooth functioning of the society and the Federation. In spite of the efforts of the Federation and the forest Department, nearly 60 to 70% of non-wood forest produce is marketed by private traders. The private traders provide the tribal with food, clothing, and financial assistance. This in turn forces the tribals to sell their products at low price to repay the loans, which has become a vicious circle. The products are then transported to wholesale dealers mr exported to other states.
The Federation often faces stiff competition from the private traders in procuring and marketing medicinal plants in Kerala. The private traders compete with the Federation by offering higher prices to the collectors. This results in the flow of products to the private sector and weakens the position of the Federation as a marketing agent.

Besides the Federation and private traders, primary collectors directly auction their collections. This practice is found at Kottur, situated in the Agastyanam Biological Park Range. The local tribals come together every Wednesday and Saturday to market their items which are actually auctioned off under the supervision of Forest Department officials. The auction procedure is a highly informal one when compared to that of the Federation. This is a unique marketing system in Kerala where the tribals meet in one place to market their commodities. However, no official sanction or recognition has been accorded to this form of marketing by the Forest Department even though it has been in existence for many years.

4.2.4 Industry structure

There are three types of Ayurveda manufactures:

1. Truly traditional, in terms of systems, practices and products. These are largely self-regulated entities, growing on the basis of track record and credibility and do not consider it necessary to scientifically validate their products and systems. Such units can grow only up to a point, beyond which they require modern methods of manufacture, distribution and R&D.

2. Companies adapted to meet modern life styles, manufacturing and marketing methods. These companies draw upon traditional knowledge and also have the ability to grow, by accepting modern technology. Nonetheless, their products are neither wholly traditional nor entirely modern and need scientific rationale.

3. Companies that use traditional systems as leads to new drug either as standardized extracts or as pure isolated active ingredients, which have been scientifically validated. These companies combine the essence of both systems to achieve global presence. However, they face regulatory problems, have relatively longer gestation and are more expensive. They also face the
constraints in them of having to validate traditional system based products by modern methods.

Manufacture of Ayurvedic medicine in its modern incarnation is over a century old in India. Major players in the Ayurveda sector are Kottakkal Arya Vaidya Sala, Kerala Ayurveda Pharmacy, Aluva and Nagarjuna. (Brief profiles of these companies are enclosed at Annexure 4).

Overall, however, the Ayurveda industry in India and indeed in Kerala is highly unorganized and comprises mostly of the cottage/small-scale sector.

4.2.5 Schemes/Incentives offered by Kerala state government

Classification of Ayurveda Centres

The elevations of Ayurveda as a Unique Selling Proposition (USP) of Kerala tourism has brought a substantial increase in the number of Ayurveda massage centres in and around all the major tourist destination of the State. To ensure uniformity of practice/quality and to prevent flaunting safety and health regulations, the Government of Kerala brought out a scheme for the Approval of Ayurveda Centres vide G.O. (MS) 140/98/GAD dated 23rd March, 1998. According to this order, a uniform approval is given to all the centres fulfilling the conditions prescribed, irrespective of its quality.

Subsequently, the Department of Tourism, Government of Kerala, has worked out a revised scheme for the classification of the Ayurveda centres in order to promote tourism in the State. The centres will be classified into Green Leaf and Olive Leaf categories based on the quality standards maintained by the respective Ayurveda centres.

Incentives to Classified Ayurveda Centres: Only those Ayurveda centres, which are classified/approved by the Department of Tourism, would be eligible to claim 10% state investment subsidy or electric tariff concession offered by the Department of Tourism. Only these centres will be considered for publicity and promotion through print and electronic media by the Department.
Financial assistance

Institutions such as the **Kerala State Industrial Development Corporation (KSIDC)** and **Kerala Finance Corporation (KFC)** have been actively supporting the manufacture of Ayurveda and Siddha products. KSIDC has funded about 14 Ayurveda manufacturing units with an exposure of almost Rs 150 crores. The organization has also been active in financing Ayurveda resorts, primarily as a part of the overall tourism policy of the Government of Kerala. The loans are normally given for a 4-6 year term. As a part of the tourism package, the Kerala Government gives a maximum subsidy of Rs 10 lakh for setting up Ayurveda resorts and Rs 15 lakhs for setting up an Ayurveda manufacturing unit. Realizing the huge potential of Ayurveda from Kerala, KSIDC has made Ayurveda one of the thrust sectors.

**Kerala Finance Corporation (KFC)** has also financed some companies like Nagarjuna.
4.3 Constraints in Export Development

Some of the constraints associated with the collection and processing of medicinal plants in India in general and Kerala in particular, which result in reducing their competitiveness in global markets, are as follows:

- **Poor agricultural practices and lack of knowledge** about proper time and methods for plant identification, collection/harvesting, storage and post-harvest treatment practices, propagation, transportation etc. Almost 70% of the collections of medicinal plants/parts involve destructive harvesting. These practices have led to depletion of certain wild growing plants due to over exploitation by local contractors.

- **Irregular availability and inconsistent quality** due to dependence on wild sources which are subject to vagaries of weather and plant diseases in tropical climate.

- **Lack of R&D** of high-yielding varieties, product and process development etc.

- **Inefficient processing techniques** including lack of trained personnel, outdated technologies and equipments.

- **Poor quality control procedures** and inadequate adoption of GMPs results in low yields and poor quality of products, as well as lack of consistency between quality of bulk supplies and the samples.

- **Lack of regulatory mechanism in trade of medicinal plants**, because of which it is unorganized and very secretive. The situation is further compounded by irregular availability (vagaries of weather, plant diseases etc.) leading to cyclic prices variations. Besides availability, prices also vary with demand and quality and are therefore unpredictable. The farmers find it difficult to plan their cropping pattern and cannot meet the market demands. Often, stocking by importers leads to glut, resulting in a sudden fall in demand and drop in prices, thus making it un-remunerative for the farmers.

- Traditional medicines also face increasing **competition from synthetic drugs**

- **Exports**
  - Lack of credible documentation of the therapeutic values of medicines and their formulations is a major constraint in exports, particularly to countries like USA.
  - Lack of assured availability for exports, in terms of quality, quantity and price
- Lack of information about the total world trade, demand dynamics in the overseas market, marketing techniques etc.
- Lack of knowledge on international and specific regulations of importing countries governing imports of such products, including quality, Intellectual Property Rights etc.
- Lack of standardization in products, processes and services.

Any new initiative for export promotion of medicinal plants, must therefore address the above issues.
5. Export Potential from Kerala

5.1 Present exports from the state
No authentic statistics are available for exports of medicinal plants and/or herbal products from Kerala. Even the leading producers of ayurvedic medicines/products in the state are not exporting directly. Therefore, the estimates of export potential for medicinal plants from Kerala, are based on the following premises:

- Majority of the exports from India are in the form of raw medicinal plants (leaves, roots and other parts of the plants) or as extracts. Exports of value added products are minimal.
- Among the medicinal plants which are already being exported from India or have the potential for exports, about 15 medicinal plant species have been identified which are presently available in Kerala or can be grown in the state in view of the suitable agro-climatic conditions.
- Although the total exports of medicinal plants/herbal products from India are of the order of Rs. 1209 crores, the exports accounted for by the above 15 species (in various forms) are about Rs. 323 crores (refer table 3.2). Therefore, this figure has been taken as the baseline data for estimating the additional export potential from Kerala.
- No data is available on Kerala’s present share in India’s total exports. However, industry experts feel that Kerala accounts for a substantial portion of ayurvedic and unani herbs/medicines exported from India (Rs. 270 crores in 2001-02).
- Almost 90% of the medicinal plants/herbs exported as such or in semi processed form are from wild sources with very small contribution from cultivated plantations.

5.2 Export targets
As stated earlier in this report, no official estimates are available about Kerala’s present share in India’s exports of medicinal plants, extracts/concentrates, Ayurvedic preparations etc. However, based on discussions with industry experts, the following scenario emerges:
Table 5.1: Kerala’s share in exports (2001-02)

<table>
<thead>
<tr>
<th>Product</th>
<th>Present export from India (Rs. Crore)</th>
<th>Estimated share of exports originating from Kerala ** (%)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Medicinal plants (dried/powdered)</td>
<td>34</td>
<td>20%</td>
<td>7</td>
</tr>
<tr>
<td>Extracts / value added capsules etc. of single herb</td>
<td>44.5</td>
<td>20%</td>
<td>9</td>
</tr>
<tr>
<td>Ayurvedic medicines for bulk sale</td>
<td>94</td>
<td>60%</td>
<td>55</td>
</tr>
<tr>
<td>Ayurvedic medicines for retail sale</td>
<td>151.2</td>
<td>60%</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>323.7</td>
<td>50%</td>
<td>161</td>
</tr>
</tbody>
</table>

** based on experts’ opinion/estimates

Based on the above estimates of present exports of medicinal plants and herbal products from Kerala, and the overall growth of world demand by 15% per annum, there should be significant potential for increasing the exports from the state.

Considering that development and marketing of medicinal plants and value added herbal products is a long gestation activity, no additional exports have been targeted in the first year. From the second year onwards however, the results will commence.

The industry sources have emphasized that Kerala has an excellent potential for substantially increasing the exports of extracts/concentrates by setting up modern processing units and adopting international standards in quality, packaging etc. Also, OTC/retail products in ayurvedic and unani preparations, which already contribute a major share in Kerala’s exports, are another thrust area, considering the substantial ethnic Indian population in USA, Europe and Middle East, who are already familiar with the products and therefore acceptability is not an issue.

Accordingly, the realistic year wise targets for additional exports in the near future, over and above the present exports and the normal increase in line with the growing world demand, are indicated in the following table.
### Table 5.2: Year wise targets for additional exports from Kerala (Rs. crore)

<table>
<thead>
<tr>
<th>Product</th>
<th>Year1</th>
<th>Year2</th>
<th>Year3</th>
<th>Year4</th>
<th>Year5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Medicinal plants (dried/powdered)</td>
<td>nil</td>
<td>1.5</td>
<td>3</td>
<td>4.5</td>
<td>5</td>
</tr>
<tr>
<td>Extracts / value added capsules etc. of single herb</td>
<td>Nil</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Ayurvedic medicines for bulk sale</td>
<td>Nil</td>
<td>1.5</td>
<td>3</td>
<td>4.5</td>
<td>5</td>
</tr>
<tr>
<td>Ayurvedic medicines for retail sale</td>
<td>Nil</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Nil</td>
<td><strong>18</strong></td>
<td><strong>31</strong></td>
<td><strong>44</strong></td>
<td><strong>65</strong></td>
</tr>
</tbody>
</table>

### 5.3  Steps required for increasing exports of Medicinal Plants

Based on various studies carried out on the subject as well as discussions with experts, the following actions need to taken to remedy the constraints in development of exports of medicinal plants:

#### 5.3.1  Identification of specific Medicinal Plants for concentrated efforts

Based on detailed discussions with senior officials of the concerned state and central government organizations, as well as from R&D institutions, manufacturers and other knowledgeable experts, the following medicinal plants have been identified for focused effort in export promotion. While most of these plants are already included in NMPB’s list of 32 high priority medicinal plants, the others are also expected to be included in the list shortly, based on a request from the state government.
Table 5.3: List of Selected Medicinal Plants in Kerala for development of exports

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Botanical name</th>
<th>Local/ Common name</th>
<th>Distribution in Kerala</th>
<th>Agrotechnique developed</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Piper longum L.</td>
<td>Magadhi, Pippali,</td>
<td>Cannanore, Wynad, Calicut, Palghat, Trichur, Emakulam, Idukki, Kottayam, Pathanamthitta, Quilan and Trivandrum, almost throughout the state</td>
<td>Yes</td>
<td>Roots, stems, fruits used especially in the treatment of diseases of respiratory tract like bronchitis, asthma etc. It is a stimulant, expectorant, carminative and alterative tonic.</td>
</tr>
<tr>
<td>2.</td>
<td>Kaempferia galanga L.</td>
<td>Kacholam, Kachula-kizhangu</td>
<td>Calicut, Malappuram, palghat, Quilan and Trivandrum district. Cultivated almost throughout the state mainly in midlands</td>
<td>Yes</td>
<td>Roots, used both in perfumery and as medicine against cough, pectorial affections, dyspepsia, headache, malaria, rheumatism etc.</td>
</tr>
<tr>
<td>3.</td>
<td>Curculigo orchiodes Gaertn.</td>
<td>Nilappan, Nilapanna-kizhangu</td>
<td>Kasargod, Cannanore, Wynad, Calicut, Malappuram, Palghat, Trichur, Emakulam, Idukki, Kottayam, Pathanamthitta, Quilon and Trivandrum districts</td>
<td>Yes</td>
<td>Tubers are used as tonic and also in the treatment of venereal diseases, piles, jaundice, asthma etc.</td>
</tr>
<tr>
<td>4.</td>
<td>Acorus calamus L.</td>
<td>Vayambu Deskkulam near Munnar, Idukki, Calicut, Palghat and Trivandrum</td>
<td>Yes</td>
<td>Rhizome containing volatile oil and glucoside acorin which has very high medicinal properties as an emetic, carminative, antispasmodic and anti-bacterial. Oil is also used in spice blends and for flavoring alcoholic beverages.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Garcinia cambogia (Gaertn.) Desr.</td>
<td>Koda-pull, Kodam-pull, Meen-pull, Punnangan, Puram-pull</td>
<td>Cannanore, Wynad, Calicut, Malappuram, Palghat, Trichur, Emakulam, Idukki, Kottayam, Pathanamthitta, Quilon and Trivandrum, almost throughout the state</td>
<td>Yes</td>
<td>Yellow pigment morellin shows antibacterial activities</td>
</tr>
<tr>
<td>6.</td>
<td>Andrographis paniculata (Burm. F.) Wall. Ex. Nees</td>
<td>Kith, Kiriyattu, Nilaveppu, kara-kanjiam, Amukkram</td>
<td>Cannanore, Calicut, Malappuram, Trichur, Kottayam, Quilon and Trivandrum, throughout the state</td>
<td>Yes</td>
<td>Whole plant is used. Remedy for all kinds of fever, laxative. Useful in cough, oedema, thirst, skin diseases, fever, ulcer and worms.</td>
</tr>
<tr>
<td>7.</td>
<td>Asparagus racemosus Willd.</td>
<td>Cannanore, Wynad, Calicut, Malappuram, palghat, Trichur, Emakulam</td>
<td>Yes</td>
<td>Tuberous roots are used particularly in nervine tonics and aphrodisiac preparations</td>
<td></td>
</tr>
<tr>
<td>Sl. no.</td>
<td>Botanical name</td>
<td>Local /Common name</td>
<td>Distribution in Kerala</td>
<td>Agrotechnique developed</td>
<td>Uses</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------</td>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8.</td>
<td>Gymnema sylvestre (Retz.)R. Br. Ex Schult</td>
<td>Chakkara-kolli, Sharkara-kolli</td>
<td>Cannanore, Wynad, Calicut, Malappuram, Palghat, Trichur, Idukki and Pathanamthitta district, almost throughout the state.</td>
<td>Yes</td>
<td>Leaves or the whole plant is remedial for stomachache, cough, biliousness, sore eyes etc. Is laxative, diuretic, heart stimulant etc. Also reported to be used against diabetes.</td>
</tr>
<tr>
<td>9.</td>
<td>Sida rhombifolia L.</td>
<td>Kurumthotti</td>
<td>Cannanore, Wynad, Calicut, Malappuram, Palghat, Trichur, Emakulam, Idukki, Kottayam, Quilon, Trivandrum and Pathanamthitta district, almost throughout the state.</td>
<td>-</td>
<td>Used in the treatment of tuberculosis and rheumatism. The mucilage of the stem has demulcent and emollient properties and is used in the treatment of skin diseases and as a diuretic and febrifuge. Also used in the treatment of rheumatism and leucorrhoea.</td>
</tr>
<tr>
<td>10.</td>
<td>Tinospora cordifolia (Willd.) Miers Ex Hook.F.ET Thoms.</td>
<td>Chittamuthu, Sitha-amuthu</td>
<td>Calicut, Malappuram, Palghat, Trichur, Quilon and Trivandrum districts, mainly in the hilly and uplands.</td>
<td>Yes</td>
<td>Stem, roots and leaves used in the treatment of jaundice and rheumatism. Also used in the treatment of general debility, dyspepsia, urinary infections etc.</td>
</tr>
<tr>
<td>11.</td>
<td>Gloriosa superba L.</td>
<td>Menthoni, Mettonni, Ventorii</td>
<td>Kasargod, Cannanore, Wynad, Calicut, Malappuram, Palghat, Trichur, Emakulam, Idukki and Trivandrum, almost throughout the state, mainly in the mid and hilly uplands.</td>
<td>Yes</td>
<td>Tubers are used in drug preparations to cure colic, chronic ulcers and piles. Externally a paste of the tube is applied to cure skin diseases. Drug property is due to the alkaloid colchicines used in treatment of gout and rheumatism. Also an important chemical for inducing polyploidy in plant.</td>
</tr>
<tr>
<td>12.</td>
<td>Adathoda beddomei C. B. Clarke</td>
<td>Chitadalotakam</td>
<td>Kasargod, Cannanore, Calicut, Malappuram, Palghat, Trichur, Idukki Pathanamthitta, Quilon and Trivandrum, almost throughout the state.</td>
<td>Yes</td>
<td>Whole plant is used and the alkaloid vascine is responsible for its therapeutic properties. Used in the treatment of bronchitis, rheumatism, cough, cold etc.</td>
</tr>
</tbody>
</table>

Note: Brahmi, Withania somnifera (Ashwagandha) and Ocimum may also be added to this list.
5.3.2 Improvement of agricultural practices:

- Education and training of persons/groups engaged in collection of medicinal plants from wild sources. Important aspects to be covered are identification of medicinal plants, time and methods for collection/harvesting, storage and post-harvest treatment practices, propagation, transportation etc.
- Provision of training and extension services to farmers engaged in cultivation of medicinal plants, covering pre and post harvest management of the crops, covering
  - awareness of new improved varieties
  - inter-cropping techniques
  - practices for organic farming
  - propagation techniques (including tissue culture)
  - irrigation requirements, particularly at critical stages
  - use of fertilizers & nutrients and crop protection chemicals
  - weed control
  - harvesting time and method
  - drying and storage
  - grading and cleaning
  - anti-microbial treatment
- Visits of growers & collectors to demonstration farms & R&D centres
- Promotion of co-operatives, as a means of self-regulation of trade

5.3.3 Reducing dependence on wild availability

- Increasing the area under cultivation of medicinal plants, by providing technical and financial assistance to farmers under various schemes of central and state government departments
- Facilitation of medium term contracts between farmers/farmer co-operatives and processors/exporters (contract farming). This would be mutually beneficial in terms of assured market for growers and assured availability for processors/exporters.
- Government procurement through minimum support price which should also be remunerative for the farmers. The co-operative federation does offer guaranteed off-take but the price not attractive enough.
5.3.4 **Conservation of the natural sources of medicinal plants**
- Establishment of herbal gardens or “vanaspati vans”
- Re-planting of medicinal plants in forest areas (in situ conservation)
- Training of persons and groups engaged in collection, to minimize damage to forests

5.3.5 **Commercially oriented time-bound R&D programmes**
- Development of packages of “good agronomic practices” for collectors, growers (including for inter-cropping), for each of the selected medicinal plant species
- Development of improved varieties (high yielding, disease resistant etc.)
- Development and production of quality seeds and planting material, through tissue culture
- Development of **organic farming** package
- Creation of a gene bank through Tropical Botanical Garden & Research Institute (TBGRI), Thiruvananthapuram.
- Active ingredients of important medicinal plants to be determined and their quality improved by combination of biotechnology and genetic engineering.
- Search for new molecules, development of new drugs, their standardisation and patenting on high priority.
- Development of production processes/equipments

5.3.6 **Improvement of processing and quality control**
- Upgradation of production and protection techniques/equipment, through incentives and support schemes, including for certification to international standards.
Improvement of post harvest handling, to preserve quality and minimize losses during drying, chemical treatments, storage, packaging and transportation.

- Training of personnel on various aspects of value addition, shelf life, storage & packaging of products (raw, extracts, preparations, drugs) as per international norms
- Encouragement through technical support and financial incentives to processing units for adopting GMPs and international quality standards, including certification.

5.3.7 **Strengthening of marketing co-operative(s)**
- Bringing more and more collectors under the co-operatives
- Establishing Self Help Groups (SHGs) of growers
- Involving private sector (processors, exporters and hospitality sector) through backward integration initiatives

5.3.8 **Export Development**
- Studies in demand supply scenario and marketing
- Creation of a scientific data base and information centre, for
  - statistics on world trade
  - price trends
  - demand patterns
  - competition
  - importers in various countries
  - regulatory aspects such as IPR, import regulations in important countries etc.
- Promotion of contract farming between growers and exporters/processors
- Facilitation of export marketing tie-ups for exporters and processors
- International exposure of growers, processors and exporters
- Other innovative marketing methodologies to develop and capitalize on Indian brand equity
6. **Integrated approach through Agri Export Zone for Medicinal Plants**

An integrated approach is required to promote the exports of medicinal plants right from the stage of cultivation, collection, storage, processing, packaging to marketing in an organised manner for selected medicinal plant species.

It is recommended that an Agri Export Zone should be established for promotion of exports of Medicinal Plants from Kerela, covering six districts, namely Idduki, Palakkad, Ernakulam, Thrissur, Mallapuram and Wayanad.

These districts in Kerala have the highest availability of medicinal plants in the state, and are geographically contiguous. The yield and quality are reasonably good and the soil is suited for medicinal plants production. Also there is potential for increasing the yield by adopting better practices. Brief profiles of these districts are provided at Annexure 5.

*Since these districts are contiguous, it will be most appropriate to designate the entire area as AEZ, as shown in the map.*

Establishing an AEZ will also enable the creation of necessary physical infrastructure for post harvest management and also facilitate a well-planned and sustained export promotion initiative.

*India is already recognized as a highly attractive base for R&D and clinical trials, with several of the world's leading pharmaceuticals and biotechnology companies successfully establishing their operations. The proposed AEZ will also aim to create enabling conditions for the medicinal plants/herbal products sector to also grow in stature and acceptance worldwide.*
Map of Kerala showing the selected districts:
7. Approach to facilitate Exports

In order to achieve the export potential above, the following programmes are recommended:

7.1 Conservation

- **Training and Education of persons/groups engaged in collection of medicinal plants from wild sources:** This should be undertaken with the involvement of NGOs and other social/environmental development organizations active in the area. The package of services should include awareness of the useful medicinal plants available in the region (from the list of selected medicinal plants) as well as additional high value medicinal plants identified in future. The same organization should also be involved in preparing scientific documentation - agronomical practices for each medicinal plant and their medicinal properties of the specific plants.

One such organization should be identified for each district under the AEZ, for developing and imparting customized training specific to medicinal plant varieties found in the district.

Financial assistance is available to reputed NGOs, under NMPB promotional schemes, for duration of three years. Cost of such a programme is estimated at Rs. 10 lakhs per district per year - therefore the total cost for three years would be Rs. 180 lakhs, of which 50% will come from NMPB scheme and balance from state govt.

- **Re-plantation of Medicinal plants:** The Forests Department of the state government should be entrusted with this very important task for conservation of medicinal plants. Based on earlier experience, about 2 lakh plants per district per year should be made available to the Forest Deptt. for this purpose.

The total cost of this programme for five years, @Rs. 5 per plant, works out to Rs. 3 crores, of which an assistance of Rs. 1 crore is available under NMPB scheme. The balance of Rs.2 crores should be contributed by the state government.
Herbal Gardens for in situ conservation: Under a programme of Department of Agriculture & Cooperation for Horticulture development, Herbal Gardens of 3-5 ha each are proposed to be set up under Kerala Agriculture University.

Under an NHB scheme a sum of Rs. 1.0 lakh (Rs. 0.25 Lakhs for basic planting material and Rs.0.75 Lakhs for establishment charges) is provided for land development, fencing, developing water sources and setting up irrigation facilities etc. Further, Rs. 40,000 per year would be available for meeting the maintenance charges for 2 years. Accordingly, a total assistance of Rs. 10.8 lakhs for six herbal gardens shall be availed under the scheme.

The state government’s contribution would be by way of providing land free of cost.

7.2 Encouragement for cultivation

Area expansion under cultivation and Extension services

Training & Demonstration to farmers on pre and post harvest management practices for medicinal plant crops, which would include a full recommended package of practices. The Agriculture/Extension Department of the state government must be strengthened to play a nodal role in demonstration and training programmes, supported by Kerala Agricultural University.

It is recommended to select 10 small farms (1-2ha each) in each district per year as model farms for demonstration of agronomic practices. This way, over a period of 5 years, about 300 farms will have been developed through demonstration and training programmes, covering an area of 450ha to 500ha. Similarly 2 medium sized farms (average 5ha) and 2 large farms (average 20ha) should be taken up from each district per year, for assistance and support.

NMPB provides financial assistance @ 50% for small farms, 40% for medium farms and 30% for large farms.

Provision of Planting material: It is proposed that in the initial years planting material should be provided to farmers free of cost. For this purpose about
2 lakh plants per district per year should be made available through the state Agriculture Department.

The total cost of this programme for five years, @Rs. 5 per plant, works out to Rs. 3 crores, of which an assistance of Rs. 1 crore is available under NMPB scheme. The balance of Rs.2 crores should be contributed by the state government.

- **Formation of co-operatives and mobilization of farmers**: The co-operative movement is already visible in the state, particularly among the communities involved in medicinal plants collection and trade. This should be further encouraged and strengthened.

  Kerala state Agriculture Department should undertake this programme, for which the estimated cost is Rs. 1 lakh per district.

- **Nursery Centres**: To meet the growing demand for quality planting material, it is proposed to set up Nursery Centres, which would be attached to each Herbal Garden. The infrastructure required for the nursery centres, such as land development, tissue culture, fungicide treatment, shade nets, mist chamber, pots/poly bags and irrigation systems will be provided at a cost of Rs. 1.25 lakhs in the first year. Besides, Rs. 0.40 Lakhs would be available for maintenance for the first two years. These centres would be set up by the second year of the establishment of the herbal gardens and will be self-supporting from the third year onwards with the revenue generated from the sale of the planting material produced.

  In addition to the nursery centres, each farmer would also be encouraged to earmark an area of 0.05 ha for seed production. Each such farmer will be eligible for an incentive of 50% of the cost of the vital inputs upto Rs. 1500 per plot. These plot owners are expected to make available maximum quantity of planting materials for distribution to the neighbouring farmers at a reasonable cost. This programme will be implemented through the State horticulture/ Agriculture Department.
7.3 Laboratories for Quality testing

The quality and yield depends on condition of soil, nutrient availability and extent of infestation with pests/diseases etc. In order to take timely corrective measures in case of undesirable changes, the proposed AEZ will have two laboratories, to be managed by Kerala Agricultural University, with facilities for testing soil, water and plant tissues, as well as GLC and HPLC. These laboratories will also serve as disease forecasting units. The total cost for establishing each laboratory would be around Rs. 60.00 lakh, of which a sum of Rs. 17.5 Lakhs will be provided as financial assistance under the NHB scheme. The balance to be funded by state government.

7.4 Processing units

Two types of processing units are envisages in the proposed AEZ.

The first level of processing will be carried out at Collection Centres/Pack Houses. Once the produce is collected at the farms or from wild sources, the same must be properly handled prior to being taken to well-equipped processing centres, or for direct exports. Such centres will be equipped with facilities for cleaning, drying under controlled conditions, sizing, grading and sorting, packaging (including consumer packs) and storage. These units will also be suitably linked with adequate storage and arrangements for transport to move the packaged produce for further processing or export.

It is proposed to set up at least 5 such processing unit in each district of the AEZ. The total cost of setting up 30 such processing units is estimated at Rs. 75 lakhs, of which an assistance of Rs. 12.5 lakhs is available availed under the existing scheme of APEDA/MFPI. The balance amount of Rs. 62.5 lakhs is to be arranged by farmers/private entrepreneurs, of which soft loan assistance up to Rs. 20 lakhs can be availed from the state financial institutions (KSIDC/KFC).

Processing units for value added products

As there is a growing potential for exports of extracts and concentrates of medicinal plants, it is proposed to set three such processing units, for processing the medicinal plants to produce extracts and concentrates meeting the
international standards of quality and hygiene. These units will have facilities for multi-purpose facilities for grinding, crushing, solvent extraction, distillation, and anti-microbial treatment etc.

The total cost of setting up six such processing units (one in each district) is estimated at Rs. 6 crores, of which Rs. 50 lakhs is to be availed under the existing scheme of APEDA/MFPI. The balance amount of Rs. 5.50 crores is to be arranged by farmers/private entrepreneurs, of which soft loan assistance up to Rs. 1.5 to 2 crores can be availed from the state financial institutions (KSIDC/KFC).

7.5 Quality system implementation

It is also important that the processing units (dry as well as value added products), to be set up in the AEZ, adopt and implement the quality systems as per international standards like Codex, PFA etc., so as to compete with other developed countries.

An expenditure of Rs. 84 lakhs has been envisaged for implementation of quality systems at the 36 locations (Rs. 2 lakhs per collection centre and Rs. 4 lakhs per processing unit), out of which 50% i.e. Rs. 42 lakhs per centre can be contributed by APEDA and balance should be paid by the respective units.

7.6 Development of Data Bank and Information Centre

Managing and dissemination of market information is very critical for success of the export promotion initiative. Hence, it is proposed to set up a state of art Data Bank and Information Centre, to be maintained by the Extension Department of the state Government. The centre will maintain detailed records on medicinal plants production and development in Kerala and India as a whole. The centre also provide information on various international practices/researches on growing, harvesting, transportation etc. and latest R & D initiatives will be made available to farmers, pack houses and exporters.

The cost of setting and maintaining such a centre is estimated at Rs. 25 lakhs. In addition to setting up the centre, initial one-time studies are required for compiling the base data on all aspects, which will entail a cost of about Rs. 50 lakhs.
Financial assistance is available for these activities under schemes of Ministry of Agriculture and NMPB.

7.7 Export Promotion and Marketing
The following activities have been envisaged to boost exports of medicinal plants, and value added products from Kerala.

- Development and promotion of brand equity for medicinal plants originating from India/Kerala.
- International exposure of Indian exporters, processors and some progressive farmers, including participation in international trade fairs to facilitate interaction with the customers to popularize Indian medicinal plants. Participants in such exhibitions would also be able to get first-hand information on other countries, in terms of quality, packing, pricing etc.

Delegations of leading importers from various countries to Kerala and organizing workshops and seminars to showcase the facilities and capabilities at each level. These buyer-seller meets can also serve as a forum for redressal of trade disputes in a speedy and fair manner.

- Linkage between growers, pack houses and exporters, R&D institutions (state level training/workshops)
- Printing of generic publicity material, for extensive circulation among the importers/buyers in the target markets.

7.8 Research & Development (R&D)
Some of the activities to be taken up as R&D projects by designated Research Institutions, with financial assistance from ICAR, CSIR, DFPI, and APEDA as applicable, are:

- Development of packages of “good agronomic practices” for collectors, growers (including for inter-cropping), for each of the selected medicinal plant species. Systematic cultivation of medicinal plants needs specific cultural practices and agronomical requirements. 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 processing stage, post-harvest treatment, storage and safety.

- Development of improved varieties (high yielding, disease resistant etc.)
- Development and production of quality seeds and planting material through tissue culture

**Development of organic farming package**: Farmers have to be trained in all aspects of organic farming of medicinal plants including obtaining certification from associations that do the monitoring starting from cultivation to final harvesting. Organic farming which is labour-intensive gives the developing countries the comparative advantage to be competitive.

- Creation of a gene bank through Tropical Botanical Garden & Research Institute (TBGRI), Thiruvananthapuram.
- Active ingredients of important medicinal plants to be determined and their quality improved by combination of biotechnology and genetic engineering.
- Search for new molecules, development of new drugs, their standardisation and patenting on high priority.
- Development of production processes/equipments

It is recommended that **Kerala Agricultural University** and **Kerala Institute for Research, Training & Development of Scheduled Castes and Scheduled Tribes (KIRTADS)**, may be designated as the nodal institutions for the R&D activities, in association with Kerala State Medicinal Plants Board.

### 7.9 Agencies involved

Financial incentives and other types of support available from various state and central organisations, under their existing/ongoing schemes, will be available to the AEZ. The procedures for availing these incentives by the farmers, entrepreneurs, exporters etc., should be simplified and streamlined under a single window mechanism at the state level. The various involved at the state and central level will be:
7.9.1 State Government Organizations

- **Kerala State Agriculture Department**
  The state Agriculture Department may be designated as the nodal organisation to set up the proposed AEZ for promoting exports of medicinal plants from Kerala state.

**Specific responsibilities for Agri Export Zone**

- To function as the nodal agency on behalf of the state government for Agri Export Zone for Medicinal plants, for co-ordination with other government agencies (central and state) as well as institutions involved in R&D projects etc.
- To facilitate and strengthen Self Help Groups/co-operatives and mobilize farmers to take up cultivation of medicinal plants.
- To identify NGOs for conducting training and education of collectors.
- To provide extension services for farmers, through Extension department.
- To organize distribution of free planting material for re-plantation of forests as well as to farmer.
- To identify private entrepreneurs for setting up processing units.
- To organise export promotional activities.
- Help the exporters and farmers to benchmark against international standards, and set up quality systems.
- To assist in implementation of international quality systems and adoption of GMPs in processing units.
- To set up and maintain the Data Bank and Information Centre.

- **Kerala Agricultural University (KAU)**
  KAU is already actively involved in research with respect to medicinal plants, and has an important role in the AEZ.

**Specific responsibilities of KAU for Agri Export Zone**

- Setting up and maintaining Herbal gardens for in situ conservation.
- Support to Agriculture department for developing agronomic packages for various medicinal plants.
- Setting up and maintaining Nursery centres.
- Setting up and maintaining Laboratories for quality testing and control.
- Identification and commercialization of new varieties which have better demand in the international market
- Acting as nodal agency for undertaking R&D projects towards varietal improvement, adaptation of modern technology etc.

In addition to the above organizations other state level organizations will have the following specific responsibilities in the AEZ:

- **NGOs:** Training and Education of persons/groups engaged in collection of medicinal plants from wild sources
- **Forests Department:** replanting of medicinal plants in forests
- **TBGRI, KIRTADS:** undertaking specific R&D projects
- **Kerala State Medicinal Plants Board:** facilitation of assistance through NMPB
- **Gram Panchayats:** Selection of beneficiaries for training and demonstration programmes, distribution of planting material etc.
- **KSIDC/KFC:** Soft loans for setting up of processing units
- **Kerala State Electricity Board (MPSEB):** To provide need based power supply to the farmers and processing units. The unit(s) would be able to avail duty free diesel for power generation as per EXIM policy.
- **Department of Sales Tax:** To extend the sales tax, excise duty, octroi concessions to packaging and other inputs etc. for processing units in the AEZ. Similar concession should be extended to exporters.

### 7.9.2 Agencies involved - Central Government

- **Agricultural and Processed Food Products Development Authority (APEDA):**
  
  APEDA will be the nodal organisation to co-ordinate programmes of various Central organizations, obtaining approval of the Steering Committee and monitoring the implementation and putting up review reports to the Steering Committee.

  In addition to a nodal agency role, APEDA will also extend assistance under various schemes.
**Specific responsibilities for Agri Export Zone**

- Market development/promotion support by way of sending trade delegations to and from the target markets
- Support for setting up / upgradation of processing units
- Support for setting up / upgradation of quality assurance systems

- **National Medicinal Plants Board (NMPB)**

  The Ministry Govt. of India has set up the National Medicinal Plants Board (NMPB), which offers financial and technical support for all facets of medicinal plants production. The complete package of incentives under the NMPB should be extended for the entire region designated as AEZ in Kerala.

- **Department of Agriculture & Co-operation, Ministry of Agriculture**

  The complete package of incentives available under the various ongoing schemes of the Ministry should be extended for the entire region designated as AEZ.

- **Department of Food Processing Industries (DFPI)**

  Assistance available to processing units such as grant-in-aid on capital investment may be extended to the units in AEZ. Various support programmes of the DFPI will be: Grant in aid and equity participation in post harvest facilities, grading/packing centres and processing units

- **NCDC**

  Support for setting up farmers’ co-operatives and Self Help Groups for group activities.

- **Indian Institute of Packaging**

  - To develop export worthy and acceptable packaging for exports of medicinal plants and other value added products.
  - To set up a field station for testing of packaging material
8. Funding Mechanism for AEZ

8.1 Funding Mechanism

The total cost of various activities under the AEZ is estimated at Rs. 21.62 crores, of which Rs. 7.56 crores can be financed through the existing schemes of various central Government departments and Rs. 691 by state govt. organizations. In addition to this, the state government will also contribute in kind in the form of land (about 35-40 ha) for setting up Herbal Gardens and Nursery Centres.

Based on this, there would be a gap of Rs. 7.15 crores for which private sector investment would have to be attracted.

Funds requirement at a glance is presented in the table below:
<table>
<thead>
<tr>
<th>Particulars</th>
<th>No./Capacity</th>
<th>Cost per unit (Rs.)</th>
<th>Total Cost for 5 years (Rs. Lakhs)</th>
<th>Government support from existing schemes</th>
<th>Private sector investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td></td>
<td></td>
<td></td>
<td>Organisation</td>
<td>Assistance amount</td>
</tr>
<tr>
<td>- Training and education of persons/groups engaged in collection of medicinal plants from the wild sources</td>
<td>One programme in each district</td>
<td>1000,000</td>
<td>180.00 (for 3 years)</td>
<td>NMPB</td>
<td>90.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>State Govt.</td>
<td>90.00</td>
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<td></td>
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</tr>
<tr>
<td>Replantation of forests by Forests Deptt.</td>
<td>60 lakhs @ 10 lakhs per district in five years</td>
<td>Rs. 5 each</td>
<td>300.00</td>
<td>NMPB</td>
<td>100.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>State Govt.</td>
<td>200.00</td>
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</tr>
<tr>
<td>Herbal gardens</td>
<td>6 @ 1 per district of size 3-5 ha</td>
<td>100,000 in first year and 40,000 per year for next 2 years</td>
<td>10.80</td>
<td>NHB</td>
<td>10.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>State Govt.</td>
<td>Land</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area expansion for cultivators &amp; Extension services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area under small farmers &lt; 2ha - Demonstration and Training for high quality-commercial production (pilot/model farms for compact area development)</td>
<td>10 farms of 1-2 ha size per district in five years, covering 450-500 ha</td>
<td>10,000 per ha</td>
<td>50.00</td>
<td>NMPB</td>
<td>25.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>State Govt.</td>
<td>25.00</td>
</tr>
<tr>
<td>Particulars</td>
<td>No./ Capacity</td>
<td>Cost per unit (Rs.)</td>
<td>Total Cost for 5 years (Rs. Lakhs)</td>
<td>Government support from existing schemes</td>
<td>Private sector investment</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
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<td>----------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Area under medium farmers 2 to 10 ha</td>
<td>2 farms per district of average size 5 ha - total area 300 ha</td>
<td>10,000 per ha</td>
<td>30.00</td>
<td>NMPB</td>
<td>12.00</td>
</tr>
<tr>
<td>Area under large farmers &gt;10 ha</td>
<td>2 farms per district per year of average size 20 ha - total area 120 ha</td>
<td>10,000 per ha</td>
<td>12.00</td>
<td>NMPB</td>
<td>3.6</td>
</tr>
<tr>
<td>Provision of free Planting material</td>
<td>60 Lakhs @ 10 lakhs per district in five years</td>
<td>Rs. 5 each</td>
<td>300.00</td>
<td>NMPB</td>
<td>100.00</td>
</tr>
<tr>
<td>Nursery centres</td>
<td>6 @ 1 per district</td>
<td>125,000 in first year and 40,000 per year for first 2 years</td>
<td>12.3</td>
<td>NHB</td>
<td>12.3</td>
</tr>
<tr>
<td>Formation of co-operatives and mobilization of farmers</td>
<td>1 per district</td>
<td>100,000</td>
<td>6.00</td>
<td>State Govt.</td>
<td>6.00</td>
</tr>
<tr>
<td>TESTING &amp; QUALITY CONTROL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratories for Quality testing - soil, plant parts, nutrients, GLC, HPLC, disease forecasting</td>
<td>2</td>
<td>60,00,000</td>
<td>120.00</td>
<td>NHB</td>
<td>35.00</td>
</tr>
<tr>
<td>Processing Units</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulars</td>
<td>No./ Capacity</td>
<td>Cost per unit (Rs.)</td>
<td>Total Cost for 5 years (Rs. Lakhs)</td>
<td>Government support from existing schemes</td>
<td>Private sector investment</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
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<td>------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>- Collection Centres / Pack Houses (drying, grading, sizing, sorting, storage and packaging facilities)</td>
<td>5 per district</td>
<td>250,000</td>
<td>75.00</td>
<td>APEDA</td>
<td>12.50 (including loans)</td>
</tr>
<tr>
<td>Processing units for value added products (extracts, concentrates etc.) including anti-microbial treatment</td>
<td>1 per district</td>
<td>100,00,000</td>
<td>600.00</td>
<td>APEDA/ MFPI</td>
<td>50.00 (including loans)</td>
</tr>
<tr>
<td>Quality System Implementation as per international standards (Codex, PFA, ISO 9001, ISO 14000) - 36 processing units</td>
<td>36 locations</td>
<td>200,000 for collection centres 400,000 for processing units</td>
<td>84.00</td>
<td>APEDA</td>
<td>42.00</td>
</tr>
<tr>
<td>Development of Data Bank and Information system (production, development, world market, international prices, regulations, import procedures policies and procedures etc.)</td>
<td>1</td>
<td>25,00,000</td>
<td>25.00</td>
<td>MoA</td>
<td>15.00</td>
</tr>
<tr>
<td>- Initial studies to create base data for Information system (assessment of demand, market characteristics etc.)</td>
<td></td>
<td></td>
<td></td>
<td>NMPB</td>
<td>10.00</td>
</tr>
<tr>
<td>Export Promotion/Marketing Development and promotion of Brand Equity for medicinal plants and preparations originating from India/Kerala</td>
<td></td>
<td>100.00</td>
<td></td>
<td>APEDA</td>
<td>50.00</td>
</tr>
<tr>
<td>Trade Delegations to important export destinations (including participation in international trade fairs)</td>
<td>6 person delegation each year for 3 years</td>
<td>1,00,000 per person</td>
<td>18.00</td>
<td>APEDA (under MDA)</td>
<td>9.00</td>
</tr>
<tr>
<td>Particulars</td>
<td>No./ Capacity</td>
<td>Cost per unit (Rs.)</td>
<td>Total Cost for 5 years (Rs. Lakhs)</td>
<td>Government support from existing schemes</td>
<td>Private sector investment</td>
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<td>---------------------------------------------------------------------------</td>
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<td>--------------------------</td>
</tr>
<tr>
<td>Organisation of visits of importers to Kerala</td>
<td>2 delegation per year (one for each season)</td>
<td>8,00,000 per year (3 years)</td>
<td>24.00</td>
<td>APEDA</td>
<td>24.00</td>
</tr>
<tr>
<td>Organisation of international workshop/seminar</td>
<td>1 per year</td>
<td>10,00,000</td>
<td>50.00</td>
<td>NMPB</td>
<td>50.00</td>
</tr>
<tr>
<td>Exposure of farmers/collectors to R&amp;D institutions, model farms etc. (state level training/workshops)</td>
<td>1 per distt. Per year</td>
<td>200,000</td>
<td>60.00</td>
<td>NMPB</td>
<td>60.00</td>
</tr>
<tr>
<td>Printing of generic publicity and promotion material</td>
<td>-</td>
<td>-</td>
<td>5.00</td>
<td>APEDA</td>
<td>5.00</td>
</tr>
<tr>
<td>R&amp;D projects</td>
<td>-</td>
<td>Cost to be estimated by the concerned R&amp;D institutions</td>
<td>N.A.</td>
<td>APEDA NMPB</td>
<td>-</td>
</tr>
<tr>
<td>Project Monitoring Cell</td>
<td>1 1</td>
<td>5 lakh per year (5 years) 5 lakh per year (5 years)</td>
<td>25.00</td>
<td>State Govt. State Govt.</td>
<td>25.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2162.10</td>
<td>Central govt. State govt.</td>
<td>756.20</td>
<td>691.00</td>
<td>714.90</td>
</tr>
</tbody>
</table>
9. Socio Economic Benefits of the Project

9.1 Exports
There will be significant increase in the exports of medicinal plants with the setting up of proposed AEZ in Kerala, considering that there is a potential to achieve additional exports of about Rs. 65 crores per year from the fifth year onwards, an increase of nearly 40% over the present level.

Better realisation in the overseas market will also in turn result in better remuneration to the farmers and traders.

9.2 Conservation of Forests and Production Enhancement
There will be an overall increase in availability, quality and productivity of medicinal plants through various interventions suggested in the proposed AEZ.

9.3 Reduction in losses by use of Post harvest Infrastructure
The provision of collection centres and processing units in each district under AEZ, will help to reduce losses and preservation of medicinal properties. Further setting up of processing units will enable value addition.

9.4 Technology Improvement
The demonstration effect of the improved practices (agronomic, post harvest, logistics etc.) will bring general awareness and motivation to the farmers of the area to adopt modern technology and practices.

Also the implementation of AEZ will make available the modern facilities like scientific storage, grading and sorting, consumer friendly packaging etc. for medicinal plants and products.

9.5 Employment and beneficiaries
The project will directly benefit a large number of farmers as well as groups/communities engaged in collection and trading. Further, the AEZ will also create direct employment for about 500-1000 people in processing units and other facilities to be created under the AEZ.
<table>
<thead>
<tr>
<th></th>
<th>Idukki</th>
<th>Thrissur</th>
<th>Mallapuram -48</th>
<th>Palakkad</th>
<th>Ema kula m</th>
<th>Wayanad exploitable/ideal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term potential -No</td>
<td>180</td>
<td>88</td>
<td>200 ha</td>
<td>50</td>
<td>Nil</td>
<td>300/600</td>
</tr>
<tr>
<td>TFO - Total financial outlay rs lakhs</td>
<td>57.38 @25700 per ha in first year rising @10% pa</td>
<td>53.72 @22000 per ha in first year rising @10% pa</td>
<td>12.21 @20000 per ha in first year rising @10% pa</td>
<td>Nil</td>
<td>75.03/150.05 @ 20000 in first year rising @10% pa</td>
<td></td>
</tr>
<tr>
<td>BL - Bank loan rs lakhs</td>
<td>51.64</td>
<td>22.18</td>
<td>48.35</td>
<td>10.99</td>
<td>Nil</td>
<td>67.52/135.05</td>
</tr>
<tr>
<td>intercrop</td>
<td>coconut</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbal concentrate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit cost of units</td>
<td>24000</td>
<td>40 pa</td>
<td>nil</td>
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<tr>
<td>TFO Lakhs</td>
<td>96</td>
<td>86.4</td>
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<tr>
<td>BL Lakhs</td>
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</tbody>
</table>