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Medicinal and Aromatic Plants of Nepal Utilization and Commercialization

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Abstract

Medicinal and Aromatic Plants (MAPs) have claimed an important place from time immemorial due to their therapeutic values in the prevention and cure of diseases Nepal's unique geo-climatic condition has made her an appropriate habitat for diverse species including valuable MAPs. But MAPs of Nepal have been declared critically endangered due to rapid rate of forest depletion, over exploitation for trade and export and lack of adopting appropriate utilization endeavor. Thus, conservation is the primary part for utilization, industrialization and commercialization of MAPs of the country. The management of precious medicinal plant species and their sustainable use for live support has become the collective concern of local community, the government, and the people who are involved in industries and business based on medicinal plants. MAPs are perennial resources of the country therefore their sustainable utilization, industrialization and commercialization is inevitable to increase income and employment of the Nepalese.

The paper highlights the medicinal plant resources as one of the most important resources of the country. Utilization of MAPs in producing traditional medicine, essential oils and non-conventional products confirms its high prospect both in domestic and international markets. It is therefore, high time to adopt holistic approach to conserve, utilize, industrialize and commercialize these precious resources with the participation of scientists, environmentalists, policy makers, planners, business communities, financial experts and resource economists.

Introduction

In his long struggle to achieve mastery over powerful forces of nature, man has always turned to plants for help. This is especially so, when he struck with, both physical and mental. Nearly all cultures, both ancient and recent have used plants as source of medicine.

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After a period of disregard and decline, these traditional systems of "green medicine" are once back to the center stage of our health programmes. There has been a steady increase in demand for such so called natural medicines, and these systems (Ayurvedic, Unani, Chinese) have now regained respectability among the scientific community, the world over. This view found importance and enthusiasm have given impetus to most systems. (PCON and RIDA, 1995:1).

The Medicinal Plants is an English terminology of Jaributi of Nepalese expression that represents the herbs containing medicinal value. Jaributi can be disintegrated as 'Jar' means root and 'Buti' means plants. According to WHO, a medicinal plant is any plant containing substances in one or more of its organ that can be used for therapeutic purpose or serve as impetus for chemo pharmaceutical semi-synthesis (PCONS and RIDA, 1995:35). Herbs and Aromatic Plants having medicinal value are referred as Medicinal and Aromatic Plants (MAPs) that have claimed a unique place from time immemorial due to their therapeutic values in the prevention and cure of diseases. It is now, generally believed that use of antibiotic and other drugs have side effects besides their prompt action. People are therefore, slowly turning back to the Medicinal Plants both for preventive and curative purposes. This tendency is observed not only in the Eastern part of the world but also Western societies as well.

Herbs and Medicinal Plants in Past

Ayurveda, science of life based on Vedas, is known as Aryan system of medicine was practiced since ancient time in Indian sub-continent. It was developed systematically more than 3000 years ago. The Ayurvedic medicines are based mainly on indigenous herbs and plants. The Unani System of medicine originated, in the early years of Arab civilizations. The Arabs brought this knowledge from Unan (Greeck) and developed an elaborate medical system. Arabs introduced the Unani system into Indian sub-continent. The Unani system also relies their medicine in indigenous herbs and plants. One common features of al traditional medical system is that all use indigenous herbs and medicinal plants as medicine.

Various medical systems are being practiced in Nepal. Besides popularity of modern Allopathic Medical System, traditional treatments like Ayurveda in city areas, Unani in lower Terai urban centers and Tibetan or Amchi in the high mountains are still main system of medicine in Nepal. Most of the traditional medicinal practiceners in Nepal are family owned profession passed from one generation to next. They prepare their respective medicinal using the available medicinal plants, Therefore, the commercial use of the Medicinal Plants have significant role in Nepal from ancient time.

Survey of Medicinal Plant Resources in Nepal

The history of MAPs can be traced back in Nepal to the Vedic period, where Nepal Himalayas was mentioned as a sacred heaven of potent medicinal aromatic plants. Rishis, Munis, Vaidyas, Kabiraj from all over the sub-continent used to come to Nepal Himalayas to collect plants and meditate to discover new plants of therapeutic values. Even to this date, Nepal is supplying genuine medicinal plants to India and recently to other parts of the world (Malla, 2003:34).

Medical practitioners inherit the knowledge of medicinal plants in Nepal from generation to generation. They collect MAPs from collectors from villages especially from the mountain region of the country. But their observation and knowledge were not well recorded. It was only in the late 19th century, and then Prime Minister Bir Sumsher Jung Bhadur Rana initiated to develop traditional medical system based mainly in Ayurveda. He wanted to familiarize and standardize the names of the useful medicinal plants of Nepal and also to update and improve traditional medical system based on MAPs. This prestigious responsibility was assigned to late Pandit Kabiraj Shree Ghana Nath Devkota. He then started to prepare *Nighantu,* a herbal pharmacopoeia of medical value of plants and it was named *Bir Nighantu.* This interesting and valuable document could not be completed during the reign of Bir Shumsher. Later Chandra Shumsher, who succeeded him as Prime Minister wanted to change its name into *Chandra Nighantu* after completion. These documents are now being displayed as objects of our cultural and intellectual heritage (Malla, 2000:35).

The botanical exploration and scientific study started back in Nepal by the foreigners. Francis Buchanan, a Scottish medical man from East India Company in 1802/03 for the first time collected plant specimens from Nepal. Later in 1820/21, Nathanial Wallich collected samples of medicinal plants in and around Kathmandu Valley. J.D. Hooker visited some parts of Eastern Nepal to collect medicinal plants in 1848. After a gap of over half a century I.H. Burkill explore a part of Central Nepal in 1907. No major botanical collection came out from 1808 to 1937 (Malla: date unknown).

As Nepal liberalized Mountaineering Expedition for foreigners in 1949, many botanist and naturalist from foreign countries started to be associated with such expeditions. Since the advent of democracy in 1951, Nepal's frontier has been opened to scientific expeditions from various countries particularly India, Great Britain, Switzerland and Japan. As a result, information on Nepalese plants including medicinal, have been amassed through outstanding publications from international universities and institutions. It was only in 1960/61 systematic studies on plants started in Nepal, when the Department of Medicinal Plants, currently Department of Plant Resources under the Ministry of Forest and Soil Conservation was established.

Distribution of Medicinal and Aromatic Plants in Nepal

The 'Himalyan land mass' with the length of 2400 km. and breadth of 600 km., surrounded by three big rivers namely Indus, the Ganges, has been serving as one of the main sources

of medicinal plants in the world since Vedic age. The Kingdom of Nepal is very rugged being hilly in the south and mountainous in the north. The altitudinal range from less than 100 m. to the top of the Mt. Everest and its phypsographic diversity under 5 broad categories has accommodated 6 bio-climatic regions ranging from the Tropical to Nival zones and 11 sub zones under them. Dense tropical broad-leaved forests of Terai in the south that gradually changes over to subtropical and temperate broad-leaved and coniferous forest at the middle reign, to the sub alpine coniferous forests and alpine pasture shrub lands and magnificent frozen peaks with many glaciers and glacier lakes in the North. This phenomenon is quite compárable to the latitudinal range from the Indian Ocean to Siberia. Hence Nepal is regarded as one of the richest regions of the plant diversity. Nepal possesses 10167 species of plants. Over 5891 species of flowering plants have, so far, been enumerated, of which 5 percent are endemic to Nepal and about 30 percent are endemic to Himalaya. With this possession that the country, Nepal is ranked between 25th and 30th position in global context and 11th in the continental scale of the diversity of the richness (Malla, 2000:33). Table 1 presents that Nepal possess 2.52 percent of plant species of the world.

Table 1
Comparative Totals of Plant Species of the World and Nepal

	Number of species		
Group (life form)	**World**	**Nepal**	**Nepal's % of world's total**
Flowering plants	>250,000	5891	2.36
Pteridophytes	>12,000	383	3.19
Lichens	>17,000	471	2.77
Bryophytes	>14,000	853	6.09
Fungi	>70,000	1882	2.7
Algae	>40,000	687	1.72
Total	**>403,000**	**10167**	**2.52**

Source: World Conservation Monitaring Centre as Global Diversity (1992) Cited from Malla (2000:34).

Status of Medicinal and Aromatic Plants of Nepal

The topographical and climatic variation has made a great variation in the distributional pattern of availability MAPs in the country. MAPs are commonly found ranging from tropical to alpine and from Mechi to Mahakli are termed as one of the precious resources of the country. According to Department of Forest (DoF) Nepal has 5891 species of flowering plants and out of that 700 species come under MAPs. Among them 238 species have been chemically tested and 246 species are considered endemic. It is due to diverse geographical and climatic condition, MAPs are found scattered throughout the country. Although detailed investigation and maps of MAPs are yet to be done and actual quantity is yet to be known,

MAPs found in Nepal can be classified into three categories:

1. Sub-alpine and alpine species
2. Sub-temperate and sub-tropical species
3. Tropical and sub-tropical species

Sub-alpine and alpine species are comparatively scarce therefore; their prices are also very high. The main MAPs found in the area are Panchuyle, Jatamasi, Kutki, Bish,Bishma, Nirmasi, Padmachal, Yarshaguma, Gucchi Chau, Shilajit, Lothsalla.

The MAPs found in sub-temperate and sub-tropical species are found more in quantity and their prices are less comparatively. MAPs found are Chirito, Timur, Nagbeli, Tejpat,Dalchini, Rittha, Dhasingare, Ghukumari, Bajradanti Chutro.

Tropical and sub-tropical species are abundantly found and they are cheap as compared to other herbs. MAPs of the region are Harro, Barrow, Amla, Bel, Khayar, Nim, Shajbrikcha, Bojjo, Pipala Satabari (Bhattari and Parajuli, 2002:130).

Medicinal and Aromatic Plants in SAARC Countries

The economic importance of MAPs to SAARC is much more important as these countries together provide 45 percent of the plants used in modern system of medicine in the form of raw materials, which are finally processed in the west. According to Feasibility Study Report on Integrated Medicinal and Herbal Cultivation and Processing Plants in SAARC countries, 1995 identified 3013 species of herbal wealth covering six countries except Maldives. Country wise availability of Herbal Species is recorded as follows:

Bangladesh	220 species
Bhutan	58 species
India	3013 species (all species found in the country)
Nepal	98 species
Pakistan	148 species
Sri Lanka	403 species

It is observed that India possess a large species of MAPs, but only 98 species are being recorded in Nepal during the study. On the contrary, recent studies have identified more herbal plants available in the country especially from wild forest.

Utilization of Medicinal Plants in Nepal

Nepal Himalaya has been known since antiquity as a rich source of valuable medicinal herbs. Over 500 of 5891 species of flowering plants are used in traditional systems of medicine such as Ayurveda, Unani, Siddha as well as folklore cures. Most of them are also used in the modern allopathic system as well. The domestic utilization of MAPs can be classified as:

i. Traditional medicine
ii. Basic materials
iii. Non-conventional products

(A) Traditional Medicines

Traditional health care systems such as Ayurveda, Unani, Tibatan or Amchi are still main system of medicine in Nepal on which majority of people have accesses to. The traditional medicine is based in available medicinal herbs. The practicerners of this traditional medical system are usually ancestral (Ayurveda) or performed by certain ethnic community (Amchi). There are nearly thirty traditional domestic medicine manufactures that use medicinal plants.

Among them Singha Durbar Vaidyakhana, a fully national enterprise has been expanded to utilize its existing technological capacity. It tries to cover all preparation required by the Ayurvedic practiceners. Although Dabur Nepal is largest in its production range concentrates on certain items, which is financially rewarding but not known for Ayurvedic preparation. Gorkha Ayurved Company was started as purchasing outlet to support for the activity of French INGO, CIDR. It buys required herbs from Gorkha District. Pyush Barshi Aushalaya is one of the oldest family owned processors. Besides Ayurvedic medicine, other manufacturers such as Kum Phen (Tibetan System) and Hakim Aushadhalaya (Unani System) are also producing their respective medicines using medicinal plants. It is really difficult to assess their quantity and value of the products, as there is lack of proper recording system.

(B) Basic Materials

There are various enterprises that produce basic materials such as extracts, essential oils and basic chemical for herbal medicine. These enterprises can be categorized as Plant Extract Enterprises, Essential Oils Enterprises and Processing Enterprises.

Plant Extract Enterprises

There are mainly five plant extract enterprises in Nepal. Among them Herb Production and Processing Co. Ltd. (HPPCL) was producing a wide rang of extracts, but production of these extracts discontinued or produced at large interval. Himalayan Ginger Product Pvt. Ltd. was established to produce ginger extracts known as oleoresin. However, it does not appear to be producing at present. Dabur Nepal has set up its extraction unit in Parwanipur in Parsa District and regularly producing Taxus bacca extracts and this crude extract is exported to India. It is observed that the enterprises of Nepalese ownership established for plant extracts could not be utilized satisfactorily. On the other hand, Dabur Nepal, a joint venture enterprise with Dabur India is producing regularly and extract is exported to India for further processing. Thus, it is a matter of great concern why Nepalese enterprises could not efficiently run the processing units.

Essential Oils

Essential oils are another important product from MAPs. There are many enterprises for processing of herbs for essential oils all over the country. They produce different essential oils both from wild resources and cultivated plants.

The essential oils produced from wild plants are:

Jatamasi oil	Rhododerndron oil	Juniper berry oil
Juniper leaf oil	Abies oil	Sugandhawal oil
Wintergreen oil	Calamus oil	Zanthoxylem oil
Zedoria oil	Artemesia oil	Sughanda kokila oil
Usir oil		

The essential oils produced from cultivation of plants are:

Citronella oil	Palmarosa oil	Lemongrass oil
Gingergrass oil	Ginger oil	Mentha arvenisis oil
French Basil oil	Chamomole oil	Eucalyptus oil

Source: Amatya, 2000:35

There are quite a number of processors for essential oils in the country. Most of them are small enterprises except HPPCL, a public sector enterprise. It has cultivation and field processing units at Bara, Sunsari, Morang and Bardia Districts and distillation and extraction unit at Kotesware, Kathmandu. Beside HPPCL, all enterprises producing basic materials are privately owned and they have their own cultivation fields in different districts of the country. It is therefore recommended to strengthen the existing enterprises and look forward for cultivation of medicinal plants in the different parts of the country according to the suitable geophysical environment of the region.

(C) Non-conventional Products

The recent trend is swing in favour of herbals. New areas having high potential using MAPs are:

i. Herbal cosmetics
ii. Herbal toiletries
iii. Herbal health hygienic products
iv. Health food and food supplements

Several enterprises are producing such non-conventional products in Nepal. These products are gaining popularity both in domestic and foreign market. Sancho Balm of HPPCL, Lal Danta Manjan, Hajmola, Dadur Hair Oil are some of the most demanded non-conventional herbal products.

The enterprises are coming up in Nepal producing herbal medicine as well as non-conventional products. Most of the enterprises are relying on MAPs collected from wild forest and only few enterprises are cultivating their own, but they are also not sufficient in

quantity for large-scale production. It is therefore, essential to increase production of MAPs by cultivating not relying only on wild. At the same time cultivation of MAPs should be encouraged not only for use in industries but also for the conservation of specified plants.

Cultivation of Medicinal Plants

Supply of MAPs to the production enterprises cannot be safeguard unless program of systematic farming is not planned in advance. Forest wealth is very limited and without supplementing this by replanting, cannot guarantee its availability in future. One of the best way to achieve this is to cultivate medicinal plants scientifically on farmer's field instead of uprooting the forest species (PCONS and RIDA, 1995:41). Realizing the fact, cultivation of medicinal plants started in small scale but an unorganized manner. Whenever there is demand for certain MAPs, enterprising farmers have tried to cultivate on their own effort. If they are successful it was taken up as a regular crop. With the passage of time cultural practices to suit the local conditions have developed slowly.

The organized cultivation of MAPs started with the establishment of HPPCL. Several private farmers tried to cultivate medicinal herbs but could not been lasting On the other hand, some enterprises started cultivating their own medicinal plants. The main commercial cultivation of medicinal herb is HPPCL. Dabur Nepal has started commercial cultivation at different areas of the country in large scale not only to supplying its enterprise but also to export as well. Recently, an Association of Herbal Crop Growers has formed under the initiation of Dabur Nepal. Many individuals, private companies, GOs, NGOs have attempted cultivation of MAP species in various location of the country.

Utilization of MAPs in Health Care System

While dealing with medicinal plants it is imperative to refer use of MAPs in health care system of Nepal. It is estimated that only 15 to 20 percent of the population living in and around urban areas have access to modern medical facility and the rest have to depend on traditional medical system using herbs. The Ayurbedic system under the Department of Ayuveda, Ministry of Health is spread all over the country including remote areas of the country. The Department of Ayurveda in 1998 listed essential Ayurvedic drugs comprising of 339 preparations under 44 main headings of systematic diseases. The World Health Organization (WHO) has recognized the importance of traditional medicine in primary health care. At present, domestic production of level of herbal drugs meet only 25 percent of the domestic requirement and the rest is fulfilled by the imports mainly from India. The import of medicines, both Ayurvedic and modern in Nepal is estimated to be of around Rs.6 billion annually, of which over one billion constitutes Ayurvedic drugs (Malla, 2000: 37). It is therefore, quite clear Nepal possess resources of large medicinal plants but could be utilized to produce both traditional and modern thereby meeting the country's demand. The modern medicine system relies on synthetic chemicals for drugs but they are also trying to replace it by herbs.

It is quite interesting to note that even in advanced country like USA, more than 40 percent of the prescription contains a drug of natural origin, either from plants (25 percent), or microbes (13 percent), or from animals (3 percent), as a sole or main active agents. The consumption of medicinal plants is worth over US$3000 million every year according to World Conservation Strategy in 1980 and the trend is increasing fast. It is estimated that perfumery, cosmetics and flavoring industries exceed 6 billion in the world. The annual value of medicinal plants contributed by developing countries is estimated to be US$50 billion. During 1997 Nepal exported crude herb valued at Rs.600 million (Malla, 2000:38). It is therefore, quite desirable to develop a scientific and rational approach for better utilization and management of these useful natural resources.

Marketing of MAPs

Nepalese medicinal plants are well known in regional and overseas markets. Different conventional oils and newly introduced unconventional oils demand is increasing from foreign customers. Consumption of herbs and herbal products within the country is limited. The percentage share of annual consumption of Nepalese herbal products in domestic and international markets is 33 percent and 67 percent respectively. The most favourable nations where Nepal exports its herbal and aromatic items are:

a) France	b) Germany	c) Italy
d) Japan	e) Australia	f) Spain
g) United Kingdom	h) India	I) Pakistan
j) USA	k) South Korea	

Source: HMG/N, 1990, cited from Lacoul and Pant, 2000:182

Trade Route of MAPs

The trade route of MAPs throughout the Himalayan region is a flow from high altitudes to the Indian plains in the south. After the harvest, the non-timber forest products (NTFPs) especially MAPs are ported to collection points on the road system – road heads – where they are loaded on to lorries for transport to India. A limited trade route in MAPs also follows in reverse, from High Himal of Nepal into Tibet and China. A notable example is Yarsa Gumba (Cordyceps sinensis), the parasitic fungus of a caterpillar found at high altitudes. In the remotest districts of northwest Nepal, the collection points are domestic airstrips: the high value products justify the cost of airfreight to Nepaljung in the western Terai. The most important airstrips in NTFPs trade are probably Simikot (Humla), Dunai (Dolpa), Jomsom (Mustang). Between the source and the markets in India, intermediaries at four levels normally handle the raw materials. Three are based in Nepal – village traders, road traders, and Terai traders. The Terai traders sell the produce to the fourth intermediary, the numerous agents and buyers in India (Edwards, 1996:40).

Marketing at Local Level

There is a network of village traders of MAPs scattered throughout the Middle Hills of the country. This network decentralizes the marketing of products to the road-head. These village traders have close relationship with harvesters of the areas. Road-traders attempts increase his control over village traders by supplying working capital as monetary advances to buy major proportion of traded resources. In turn, the village traders give advances to the harvesters as well. Thus there is close relationship between village traders and harvesters. This is general practice of marketing of MAPs in local level.

Road-head Traders

Road-head are known as the main center of activity in MAPs trade within Nepal. Independent harvesters and village traders sell their products to the road-head traders who in turn deal with Terai traders. In most of the cases, road-head traders are District Forest Officers (DFO) themselves. The road-head centers are the location where traders pay government royalties and get permission to export as well.

Terai Traders

The Terai traders are the most powerful groups of intermediaries in MAPs trade. Most of them are from Marwari community having regular contact with Indian importers and businessmen. Terai traders tend to operate as cartels preventing new-entrants into the trade and reducing bargaining power of road-head traders.

Indian Traders

The main centers of MAPs of Nepal in India are Delhi, Calcutta, Bombay and smaller market as Kannauj, Kanpur, Patna and Ramnagar. The whole sellers and commission agents of these markets of Indian cities buy medicinal plants from Terai traders and sell to Ayurvedic medicine and essential oil industries. But trade in India is much more competitive than in Nepal.

Marketing Overseas

The MAPs of Nepal are exported to overseas market either for processing or for direct sale to consumers. Nepal faces difficulty in exporting MAPs to the third country via India. Transit through India is not straightforward due to the bureaucratic delays as well. The use of international flights to sell directly to overseas market is rare, although it is favourable for few high value products.

Demand of MAPs

As already been mentioned that demand of MAPs inside the country is only 37 percent. Generally domestic demand of MAPs can be categorized as:

i. *Processors who process the raw materials to products as essential oils, extracts and resinoids.*

ii. *Ayurvedic and Herbal products manufactures in traditional medicine, herbal teas and similar products.*

iii. *Other uses such as spices, local folklore cures, non-edible and non-medical purposes such as dyeing of various kinds of fibers.*

Source: Amatya and Chitrakar, 1995:5)

It is often mentioned that Nepal imports Ayurvedic medicine worth Rs.13 to 14 crores from India, the domestic production is nominal. Despite having raw material for Ayurvedic medicines Nepalese medical practicernors could not been able to produce sufficient medicine to cater the domestic demand. Even many praticernors have started to use imported Ayurvedic medicine from giant manufacturer such as Dabur, Zandu, Hamdard and Vaidyanath. Only few domestic manufactures are producing for commercial purposes such as Gorkha Ayurvedic Company, Krishna Aushadhalaya,, Arogya Bhawan, Piyush Varshi Aushadhalaya. Singhdurbar Vaidyakhana does not produce in commercial purposes but to supply at various Ayurvedic Health Depots throughout the country and for sale in its premises. Similarly, Ayurvedic Hospital, Nardevi prepares its own medicine using medicinal plants but their production is quite low thus can be ignored for the assessment of the total demand of the country.

Export Demand

India is the main importer of MAPs that is estimated around 90 percent of the total export. Because of many factors trade with India is easy, thus most of time the records from the custom give highly deflated figure. In spite of the weakness in providing a correct picture of actual flow of MAPs in India, the high fluctuation in volume of trade is observed. The large Ayurvedic companies of India are using most of the items imported from Nepal. They are also looking forward for plants, which are used for modern Allopathic medicine as well. A public notice under the foreign Trade and Development, Government of India issued to check indiscriminate export of herbs of medicinal value of Indian genetic materials. As a result, their export is likely to be restricted; hence there is possibility of fall in demand of MAPs of Nepal in India.

Regional Demand

There is a good demand of Nepal's MAPs in SAARC region and Tibet as well. Many enquiries are made for supplies, but translation of enquiries into business deal has taken

place only for a negligible volume. As a result, only a few consignments have been exported. The main countries where export is taking place at regular basis are Tibet and Pakistan (Amatya and Chitrakar, 1995:8).

International Demand

The use of MAPs in developed countries such as Europe, USA and Japan follow according to Pharmacopoeal guidelines. At present, there is an increasing popularity of MAPs as natural health supplements among consumers. A growing awareness for natural products related to fitness and health has increased the demand of MAPs in those countries. The sale of medicinal herbs in European countries has grown from 1980 figure of 725 million ton to 172 billion tons in1992. Japan becomes a large importer of plant products these days. The total import of Japan in 1993 is recorded 15.2 billion ton per year. It is to be noted that many legal restrictions on herbs as medicine exist in developed countries. At the same time many 'naturalists' have pressed many countries to relax their regulation to some extent. This could be good prospect for herbal products in these countries. Even in European countries France and Germany are the main user of 'herbal medicine' (Amatya and Chitrakar, 1995:9). However, the imported items from Nepal do not come under the popular demand of these countries. Though in a small scale the export of 'Lycopodium' appear to be stable to USA, Japan, Malaysia and Germany. Thus, the volume of raw material traded from Nepal is insignificant in the overseas market.

Market Prospects

The general impression of international market is that MAPs are over supplied. But it is actually not the case. However, there is positive attitude towards herbal medicine all over the world. Government of most of the countries have affirmed their policy not to restrict the herbal remedies so long as they are safe. Any plant drugs that are proven to have undesirable side effects are found to be restricted by the government (Amatya and Chitrakar, 1995:10). The leniency of the government policy towards the use of medicinal plants and herbs in developed countries indicates the prosperous market of MAPs.

Market of Essential Oil

While dealing with MAPs it is essential to deal market of essential oil separately. Essential oils are products of aromatic plants that basically used as basic material in medicine, perfumery and flavors. Usually they are not used directly by the consumers but used by industries as ingredients in very small quantities in total composition of the end products. The main sectors using essential oils are:

- Personal Care and Cosmetic and Toiletries
- Perfumery
- Household Products (cleaning agents and fresheners)

- Food and Beverages
- Health care products
- Medicines

Essential oils are used only in a limited scale within the country and most of them are exported. In absence of perfumery manufacturers within the country, the main markets of essential oils are foreign perfumery houses. Lever Nepal, a subsidiary of a multinational company has recently entered the Soap and Detergent manufacturing sector. Some of the noted companies that demand essential oils in Nepal are Dabur Nepal, Nepal Tooth Products, Brighter Tooth Products and HPPCL. It is therefore, good prospects for essential oils to expand manufacturing field to cater the domestic demand.

India is a large country for manufacturing and utilizing perfumery raw materials. Beside their own source India is also importing some essential oils from Nepal. The main products Nepal exports to India are Clove oil, Lavender oil, Geranium oil, Patchauli oil, Spermint oil, Beramot oil, Rase oil, Resinoids etc. Thus India is a good market for Nepalese essential oils.

According to a study report prepared by ITC in 1986 on the international market of essential oil presents that there are 50 main essential oil markets based on botanical origins. Moreover, the total value of world imports of essential oils reached over 1 billion in 1990 from 837 million in 1987 (Amatya and Chitrakar, 1995:12). As a country USA is the largest importer of essential oils followed by Japan, where as EC is the largest group. It shows bright prospect for exporting oils in processed form. It is also to be noted that natural favour oils enjoy more stable demand in food industry. A significant trend of popularity of natural favour in cosmetic industry also confirms the rising demand of essential oils in international market as well. The above discussion reveals that Nepal could export more essential oils in the international market. The obvious advantage of exporting oils is that Nepal can process plants into oils within the country thus exporting added value of the products.

Social and Economic Values of MAPs

The increasing demand of MAPs both in national and foreign markets not only generate income of the people but it has social as well. At present, more than 12,000 forest user groups (FUGs) have formed and more than 1.4 million households are managing 1 million hector of Community Forests in Nepal. About 80 percent of rural people in remote areas still use medicinal and herbal plants for the treatment of various types of illness by themselves. It is also used for the treatment of livestock. Usually poor forest users are the main collector of medicinal plants from which they can improve their livelihood (Shrestha, 2060:28). MAPs are perennial and tangible commodity that can be cultivated on open spaces of Community Forests. As such plants can be harvested in short duration thereby generating income of the poor. Thus, cultivation of MAPs in Community Forests would support poverty alleviation program. Cultivation of MAPs needs no big investment and it has less risk of price fluctuation FUGs can earn good profit out of it. According to one study, FUGs of

Darchula district are earning Rs.40,000 per year by collecting and selling MAPs and most of them are poor. Similarly, in Dolpa district it is said that one individual can earn more than Rs.50,000 net profit per year collecting and selling Yarsagumba. In Dandeldhura district Community Forest has become model unit to manage MAPs.

No doubt, Community Forestry Program endures good opportunity for the promotion of MAPs and at the same time helping to reduce poverty of rural people, but there are some constraints as well. Most of the FUGs do not know about valuable plants and their management. FUGs are simply local collectors; they sell MAPs to local traders without having knowledge about price and value of precious plants. Moreover, over and un-time harvesting has become problematic that has threatened the survival of some of the valuable species.

Revenue Generation to the Government

In one of the studies conducted on NTFPs by Malla et al, (1995) recorded that custom revenues during the fiscal year BS 2048/49 was Rs.307 million, which is quite significant source of the governments revenue from forestry sector. It is recorded that royalty of Rs.3 to 7.4 million per annum collected by the DoF from the dealers during the fiscal years 2046 to 2049 BS (1989 to 1992 AD). The official export volume had also seen rising and the major bulk of export to India. Export to other countries, through small in volume and value, are of more processed forms than those sent to India. MAPs extracted from the forest and royalty collected by DoF from the dealer all over the country is shown in Table 2.

Table 2
MAPs Extracted and Royalty Collected During FY 2049/50 to 2055/56

Fiscal Year BS (AD)	MAP extracted from the forest (Tons)	Royalty collected by DoF NRs. In Million
2049-50(1992-1993)	5679	11.00
2050-51(1993-1994)	11694	15.82
2051-52(1994-1995)	3869	——
2052-53(1995-1996)	3234	20.69
2053-54 (1996-1997)	6632	35.18
2054-55(1997-1998)	2572	17.01
2055-56 (1998-1999)	3965	31.20

Source: Malla, 2000:37

The volume of MAPs and royalty collected during FY 2049/50 to 2055/56 ranged from 2572 to 11694 tons and Rs.11 million to Rs.35.18 million respectively. However, export data and custom revenue of MAPs could not be obtained. Master Plan for forestry sector (1988) claims that 15 percent of GDP in Nepal is contributed by the forestry sector which include MAPs as well.

Table 3
Royalty and Income Generation from Collection of MAPs in Different Fiscal Years.

Fiscal Year	Qty. Collected Tons	Royalty NRs.	Market value of MAPs	Number of families Involved in collection	Average Annual Income per family
1990/91	3448	3,490,000	35,500,000	12400	2822
1991/92	6217	7,400,000	75,800,000	12524	6052
1992/93	3372	5,650,000	65,600,000	12576	5216
1993/94	5779	11,330,000	134,300,000	12800	10492
1994/95	5680	11,258,000	154,100,000	12834	12007
1995/96	3233	11,011,000	80,825,000	12930	6250
1996/97	4130	17,825,000	120,390,000	13020	9246
1997/98	15084	25,483,858	452,520,000	22626	20000

Source: Maharjan, 2000:327

Table 8 presents the quantity collected, royalty obtained and the market value of MAPs during the period of 1990/91 to 1997/98. The number of families involved in collecting MAPs and average annual income of the family is also presented in the table. It is observed that MAPs have positive trend in all variables mentioned above that depicts the importance of MAPs in Nepalese economy.

Table 4
Revenue from Forest Products, 1996/97 to 2002/03

(Rs. in '000)

Fiscal Year	Sales of Timber	Herb Item	Miscellaneous	Total
1996/97	268177	25699	23951	319618
1997/98	186935	25484	29227	242769
1998/99	200128	16609	38195	254932
1999/00	290298	21454	33317	34506
2000/01	289022.86	14993.68	16082.82	320099.36
2001/02	358578.92	50715.24	49415.38	458709.54
2002/03	437386.48	51338.01	18501.48	507225.97

Source: Statistical Year Book, 2003:103 and 2004:112

Table presents the revenue generation from forest products including timber and herbal items. Revenue from herbs increased more than double during the period of seven years. But it could but be considered satisfactory because the evasion of royalty paid is rampant especially high value MAPs. As for example the price of Yarsa Gumba ranges from Rs.80 thousand to Rs.1 lakh and 20 thousand per kg. One kilo of Yarsa Gumba contains 3 to 4 thousand of plants. One can collect only 300 plants a day in harsh environment and the

collectors are compelled to sale in a very low price; the traders reap the main benefit. The royalty for 1 kg. is fixed at Rs.20,000 per kg. Due to this high rate of revenue the government could not receive even a rupee of royalty from Drachulas. Unless the government reduces the royalty at reasonable rates people would reluctant to pay. Moreover the internal conflict within the country has also aggravated the problem of royalty not been able to collect. Thus, it is essential to monitor and manage trading channels of MAPs from high mountain region to low Terai belt. At the same time it is imperative to disseminate the knowledge of MAPs to collectors, traders, policy makers as well as to general public.

Acts and MAPs

The separate Law and Act addressing the conservation, utilization, marketing and exports had not observed till 1995. On the other hand, MAPs had been kept under NTFPs in Act and Regulation. The Forest Rule 1995 is enacted to enforce the Forest Act, 1993 comprises 69 rules and 25 schedules. The rules contain management of six different types of forests and specific rules contain for the main forest products, such as fuel wood and timber. However, fodder and MAPs are classified as 'other forest products'. Thus it is essential to address MAPs as separate product. But Rule 11 of the Forest Rules 1995 deals with the collection, sale and distribution of medicinal herbs. Some of the rules mentioned are as follows:

1. *"Any person desirous of collecting the medicinal herbs mentioned in Schedule 3 from any forest area must submit an application to appropriate authority District Forest Officers (DFO) explicitly mentioning the type of medicinal herbs, the area of collection, the quality and the purpose of collection.*
2. *In case it is found through enquiries into the application filed under Sub-Rule (1) that no ban has been imposed on the collection of medicinal herb for which request has been made, the appropriate authority may issue the licence to collect the medicinal herbs in the form indicated in the Schedule (4).*
3. *The appropriate authority shall compare the medicinal herbs collected according to the licence issued for the collection under Sub-Rule (2) with the licence, check their quantities, collect fees as mentioned in Schedule 3, and issue release order in the form indicated in Schedule 5.*
4. *Notwithstanding anything contained in Sub-Rule 3, the licence to collect and sell and distribute the medicinal herbs of the variety specified by HMG may issued to the person who offers the highest bid in an auction.*
5. *For the purpose of identifying and selling and distributing medicinal herbs which have not been mentioned in Schedule 3 and which have yet to be identified, the appropriate authority shall submit the matter to HMG and take action as sanctioned by HMG." (Amatya and Stoin, 1995:2).*

The aforementioned rule is one of the most important rules regarding collection of MAPs especially high altitudes and harvested from government-owned land and forest. Similarly Rule 13 Provisions relates to export of forest products.

1. *HMG may, by notification in the Rajpatra, ban the export to foreign countries of any specified categories of forest products.*
2. *In case any individual organization, association, or industry submits an application for permission to import from foreign countries and sell and distribute or re-export to foreign countries any product other than whose collection, use, sale and distribution, transport and export have been banned along with the Customs declaration forms and the authentic evidence from the concerned country, the appropriate authority may grant to do so.*

Referring to the above rules, Notice 3 points out that yarsagumba, panchaule are banned from collection, use, sale, distribution, transpot and export, whereas jatamasi, sarpagandha, sugandhakokila, sugandhawal, chyau, silajit, talis parta and loth salla are banned from export only. The latter two species have been newly included in the list of item not to be exported in an unprocessed form. (Amatya and Stoin, 1995:3).

TRIPs and MAPs

Theoretically speaking trade liberalization is a means to promote economic development through better allocation of global resources. In reality, trade liberalization policy promoted by World Trade Organization (WTO) is failing short of promoting free and fair trade at global level. Most of the agreements provide monopoly rights to the Transnational Corporations therefore, there are the problem of piracy of genetic resources, traditional knowledge, skill and practices. On the other hand, there are some agreements within WTO that go against its core principle the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) is one of them. TRIPs Agreement protects the genetic resources, traditional knowledge, skills and practices. Since Nepal formally became the member of WTO, HMG should not delay to register valuable MAPs, its knowledge and skill to protect priceless genetic resources of the country.

Recent Efforts to Conserve MAPs

The protected plant species in Nepal under the Forest Act 1993 are:

1. Cordyceps sinensis (Yarsagumba)
2. Doctylorhiza lotogirea (Panch aule)
3. Cinnamomum glancesceens (Sugandha kokila)
4. Lichens (Jhyau)
5. Nardostachys grandiflora (Jatamasi)
6. Valeriana jatamasi (Sugandhibal)
7. Rauwaltia sepentina (Sarpagandha)
8. Taxus baccatta sub wallichiane (Lotha salla)

The first two species are ban for collection, sale, distribution, transportation and export and the remaining species are ban for export outside the country in crude form. The medical herbs of high value are depleting rapidly especially in high altitude, their conservation and management is inevitable. No doubt, there is a policy of public private partnership associated

with herb production, processing and marketing since FY 2002/03. The conservation program is implemented in districts like Dolakha, Ramechhap, Lalitpur, Dolpa, Humla and Jumla. The main objective of the program is to collect genes of near extinction herbs as Chirato, Raulphina, Sugandhawal and Rudrakhya. A ten Year Nepal Flora Project has implemented since FY 2002/03 with a view to maintain the complete record of plant resources through national and international coordination and cooperation. The Tenth Plan (2002 – 2007) has allocated Rs.496 crores for 13 programs for development of Non-timber Forest Development Projects that includes MAPs also.

Conclusion

According to World Conservation Monitoring Centre as Global Diversity 1992, Nepal ranked between 25th and 30th position in the global context having 2.52 percent of the plant species of World's total. High mountains are the main source of high value medicinal plants in Nepal and low value MAPs are generally found in Siwalik and Terai region. It was only in 1960/61, systematic studies of plants started when Department of Medicinal Plants, currently Department of Plant Resources was established. In Nepal, the knowledge of herbs and plants as medicine inherited from father to sons. Thus, commercial use of MAPs have significant role in Nepal from ancient time.

The domestic utilization of MAPs can be classified as traditional medicine, basic materials and non-conventional products. The numbers of enterprises, both domestic and joint ventures are producing traditional medicine and essential oils. The herbs and medicinal plants are generally collected from wild and only few enterprises are cultivating their own, but they are not sufficient for large-scale production.

Consumption of herbs and herbal-based products within the country is limited and majority of them are exported. The percentage of domestic consumption of herbal products in domestic market is only 33 percent and the rest 67 percent are exported. India is the main market of Nepalese herbs, where 90 percent of MAPs are exported. Among the third countries, France and Germany enlist at the top for importing essential oils. This clearly shows the bright prospect of MAPs in the international markets as well.

Usually, the trade route of MAPs of Nepal is the flow from northern high altitude to lower altitude to the plains of India in south. Sometime reverse trade follows in the route from high Himal to Tibetan plateau to China. The collectors or harvesters of herbs are usually poor villagers and they are compelled the sell in the cheap price to the local traders offered by them. Thus, intermediaries earn most of the profit. Most of these collectors do not know the value of MAPs so there is high chances of un-time harvest and exploitation of endangered species. Moreover, HMG is not getting the royalty from most of the MAPs and the rate of royalty is also not scientific. The collector or traders either do not pay or do not have capacity to pay the royalty.

Although the nature is unkind in High Mountains of Nepal, but it is blessed with valuable herbs. It is therefore good prospect in the mountain especially western region where people are poor, medicinal plants is the prosperous resources for development.

In context of previous discussion some suggestions are worth mentioning.

1. It is essential to increase production of MAPs by cultivating not relying only on wild forest. Cultivation should be done not only for industries and for export but for conservation of specified and endangered plants as well.
2. Essential oils are greater demand in developed countries therefore, Nepal should produce those oils which are greater demand having high value in third countries.
3. The knowledge about value and price of herbs should be disseminated by organizing in a group or cooperatives of rural collector so that local trader may not cheat them.
4. HMG should determine the practical royalty rates for different MAPs so that the collector or trader would not evade royalty.
5. HMG must be vigilant in preparing lists of MAPs so that problem of piracy of the genetic resources, traditional knowledge, skills and practices are protected.
6. Nepal should diversify the export of MAPs within the region and overseas markets.
7. It is high time to adopt holistic approach for production, and marketing of MAPs that should involve scientists, environmentalists, planners, resource economists, entrepreneurs, business community, financial experts and policy makers. It is inevitable for conservation, utilization, industrialization and commercialization of precious resources of Nepal.

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