

STAR
Research Journal

Available online at www.starresearchjournal.com (Star International Journal)

ECONOMICS
UGC Journal No: 63023



MEDICINAL PLANT TRADE AND AYURVEDIC INDUSTRY: REALISING THE LINKAGES

Dr.Sunilkumar S. Menon¹ & Dr.Shaheed Ramzan C.P²

¹Dr. Sunilkumar S. Menon, Assistant Professor And Head, Research And Post Graduate Department Of Economics, Maharaja's College, Ernakulam, Kochi,

²Dr.Shaheed Ramzan C.P, Associate Professor , Government College, Kodanchery, Kozhikode, Kerala

ABSTRACT

Industrialisation is frequently considered as the replacement of farming and resource extraction by manufacturing and service activity. It is the most popularly tested antidote for development. The development experience of countries reminds that industrialisation has provided the initial stimulus to development all over the world. Industrialisation, which helps mass production raises effective demand and rescues nations from economic recessions. The earliest form of industrialisation occurred at household levels where households converted inputs into output. The earliest impetus to industrialisation has always been triggered off by resource based industries. Among the various resource based industries, the one that has shown significant progress over years are the minor forest product industries. It includes all those industries that use raw materials other than timber, obtained from forests as the basic input. But over the years these minor forest product industries have grown into such an extent that they are now renamed as Non-Timber Forest Produce (NTFP) industries. Ayurvedic medicine manufacturing industries uses non timber forest produce as their chief raw material. There is thus a very close nexus between the Ayurvedic industry and medicinal plant trade. The paper examines this linkage and its importance with respect to the state of Kerala.

Keywords: Medicinal Plant, Ayurvedic, Medicinal Plants Journal, Ayurvedic Medicinal Plants, Ayurvedic Trades

MEDICINAL PLANTS, SUPPLY CHAIN, LINKAGES

Since the time immemorial people have gathered plant and animal parts for their needs from forest. Forest was his first mother providing all that he needed which included edible nuts, fruits, mushrooms, herbs, spices, fodder fibers for construction of shelter, and materials for clothing. Even today a considerable portion of the people in developing countries derives a part of their subsistence income from forest products (Iqbal, 1993; Walter, 2001). The first known written record of curative plants was of Sumerian's during 2200 B.C. In the 5th century B.C, the Greek doctor Hippocrates listed out some 400 herbs for common usage. Dioscorides, in the first century A.D, wrote an herbal directory by using 600 plants which ultimately became the base for many later works.

Herbs have been used for uncounted time for various purposes like healing the sick and infirm. Most of the people still continue to use herbs to benefit their bodies and believed that herbs helped to keep the body in tune with nature. Man has also been aware of the effects of herbs on the body, mind and emotion, for instance flowers were utilized to attract love, food and protection. Fragrant plants were worn to heal the body and give a sense of well being. The most costly flowers are offered to gods and goddesses and the use of aromatic incense is recorded from the earliest of times. Medicinal plants which are considered to be the most popular non timber forest product, includes goods of biological origin

also. There are many scientific studies being undertaken different parts of the world to discover the use of medicinal plants in western medicine.

Medicinal plants play a central role in safeguarding and enriching the lives of people. Human competence of using natural products for health and curing of diseases has been in practice since his origin and medicinal plants are the mostly used item (Susan and Marla, 2003). Traditional system of medicine uses a wide spectrum of natural resources as a part of their pharmacopeias. Medicinal and Aromatic Plants (hereafter MAPs) play a considerable role in meeting the demand for traditional medicine market both nationally and internationally. The proper number of medicinal and aromatic plants used in the formulations is not correctly known. The WHO has estimated that since 1971 around 21,000 plant species are used in medicinal formulations (Penso, 1998). However in China alone 4941 out of the 26,092 native spices are used as ingredients in Chinese medicines. If the total number of flowering plant species coming around 42,200, is added to this list of 21,000 then the total number of plants used in medicinal formulations will exceed 50,000.

The Ministry of Environment and Forestry, Government of India has identified 9500 species of medicinal plants that are used by the pharmaceutical industry of this nearly 2300 are used by traditional medicines and at least 150 medicines are used on a large

scale (EXIM Bank, 1997).

It can be seen from the table that India possesses a rich tradition of indigenous knowledge of the use of medicinal plants. Twenty percent of our plant species have medicinal value. China follows India with 19 percent. Ayurveda identifies three groups of natural products derived

from animal plant and mineral kingdom as a source of drugs and diets. Among these the sources from plants supersede other two. The use of turmeric to cure wounds is very popular in the Indian epics.

Table.1: Plant Species used for Medicinal Purposes in Different Countries

Country	Plant species	Medicinal Plant Species	Percentage
China	26092	4941	18.9
India	15000	3000	20
Indonesia	22,500	1000	4.4
Malaysia	15,500	1200	7.7
Nepal	6973	700	10.0
Pakistan	4950	300	6.06
Philippines	8931	850	9.5
Sri Lanka	3314	550	16.6
Thailand	11625	1800	15.5
USA	21641	2654	12.26
Vietnam	10,500	1800	17.1

Source: FAO, 2014

Plant base is widely used in drug processing, development and application (Kamboj, 2000). Amongst the Ayurvedic drugs manufactured today, 57.4 percent of them are only herbal, 28.7 percent are herbo-mineral-metallic and the rest of the 13.9 percent are mineral-metallic preparations. This helps to understand that the plant base is crucial for formulating the Ayurvedic medicines. At the same time it is this plant base that creates better demand for the medicines

MATERIA MEDICA OF AYURVEDA

The literature in Ayurveda is rich with regard to its materia medica. Ayurveda contains a wide and crystal clear account of the various plant formulations and their correct composition. The Aushadi Sukhta in Rig Veda (Section 10, Chapter 97 verses, 1-23) is the oldest document available on medicinal plants in India. This document mentions about morphological character of the plants, their therapeutic classification, habitat and the curative properties. These hymns convey that the use of plants was based on observation of their effects on other species.

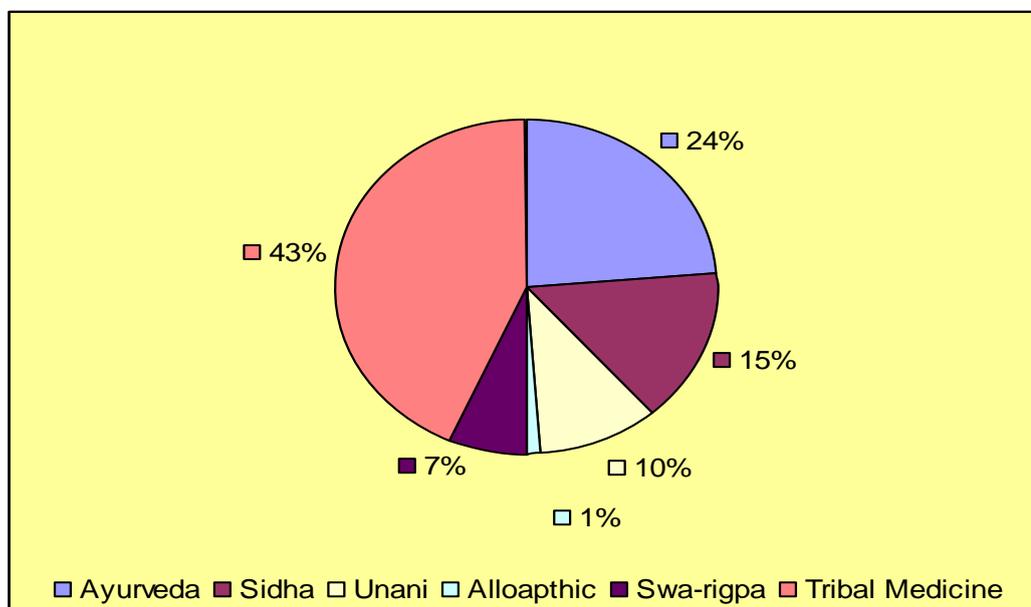
Another document referred as the Doctrine of Signature teaches to compare parts of plants with parts of human body. Ayurveda has a unique way of understanding plants starting from the earliest Ayurvedic text of Charaka Samhita (1500 B.C- 400 A.D). It describes irrespective of their approach and principle use plants in their drug formulation (Tewari, 1999). The difference lies in the content

about 600 plants and their medicinal uses. These Samhitas deal with their nomenclature, descriptions for identifying the plant, the time to pluck the plant, its biological characteristics and actions, habitat, regional specifications and the types of poisonous plants. Charaka Samhita also teaches about the way to collect, classify, combine and process these plants for producing 341 drugs. Other Samhitas like the Susrutha Samhita, (395 drugs) Astanga Samhita, AstangaHridaya (all written before the Seventh century) also deal with this knowledge. A few other Samhitas such as Bala Samhita and Kasyapa Samhita are not available in the complete form today (Unnikrishnan, 2002).

The depth of the materia medica of Ayurveda can be known from the glory of Ayurvedic pharmacological literature. It is to be remained that all systems of medicines

of the plant base. Allopathy Ayurveda, Unani, Homeo and the tribal medicine’s usage of medicinal plants is well acknowledged. The amount of plants and plant base used in their formulation can be understood from the figure given below.

Figure 1: Medicinal Plant Species Used in Various HealthCare Systems



Ayurvedic medicines contain the food items such as jaggery, spices, oils sugar, milk, ghee, animal products, honey, fresh and dry fruits (Harilal, 2004). But around 80-85 percent of the total raw materials used is plant based or some way or other related to plants. The roots, tubers, bulbs, leaves, fruits, flowers and barks of wild vegetation, depending on their active principle contents, are used for the preparation of medicines for different ailments (Ray et al., 2003). Indian rich biological diversity supported the system of medicine from time immemorial. The diverse agro-climatic conditions, variation in regional topography, occurrence of variety of floral and faunal types, different human practices have not only contributed to the richness of Indian biological diversity, but also have maintained the same to a great extent.

Tribal people in India, mostly forest dwellers, played very significant role in the identification, conservation and collection of medicinal plants from the very ancient times. A number of drugs were introduced from other parts of the world through trade and commercial relations. It is estimated that only 16.5 percent of the drugs require whole medicinal plant where as others needs one or more than one medicinal plant part (FRLHT, 1997). The raw drugs consist of roots, rhizomes, leaves, flowers, fruits, seed oil, gums and resins bark and wood or whole plants.

Roughly one third of the medicinal plants used are trees and this corrects the belief that medicinal plants used are mostly herbs. Hence conservation of trees is more important than the conservation of plants. It also denotes that 16.5 percent of the Ayurvedic formulations use the whole plant. 10 percent of the medicines use the fruits and 2.8 percent of the drugs use the

wood. Thus it has to be inferred that no part of the plant is left unused in Ayurveda. This substantiates the crucial linkage between the Ayurvedic industry and medicinal plant market.

It is to be added here that a single Ayurvedic medicine may contain numerous plant species. A list of commonly used Ayurvedic medicines and the number of plant species used in it are given in the table below. It is clear from this table that the average number of medicinal plants used in drug formulation varies from three to 68. The list of ingredients and the optimal composition of the plants are really laid down in the Samhitas which form the reference base for all drug formulations. These Samhitas however insist that there is no scope for any substitution of medicinal plants in the process of manufacturing. This makes the Ayurvedic drug manufacturing a rigid process.

Table 2: Selected Formulations and Number of Plant Species Used

Formulation	Used for	Number of plant species used
Chyawanaprash	Health supplement	40
Rasnadi choornam	For fever & head ache	25
Dashamol arishtam	Gastro disorder	68
Dhawanantharam oil	Arthritis	44
Katuriadi pills	Gastro complaints	30
Agasthya rasayanam	Respiratory troubles	23
Brahmi kritham	Memory power	12
Elaneerkuzamphu	Ophthalmologic	7
Muktha arishtam	Pediatric indigestion	9
Thriphala choornam	Digestion, Vision	3

Source: *SahasraYogam*, (Ed) 2000.

SIGNIFICANCE OF MEDICINAL PLANTS

The significance of medicinal plants in the development of a subsistence economy has to be well accepted. The production, post harvesting, marketing of medicinal plants have a good potential in the raising of the income of the rural people especially the tribal community. Various environmental factors also contribute towards the cultivation of medicinal plants.

SOCIO- ENVIRONMENTAL FACTORS

Rural poor especially women and the tribal folk are the principal collectors of medicinal plants from the forest. It is a chief source of income for this group of the people. The demand for Ayurvedic medicines has increased, leading to a manifold increase in the demand for medicinal plants. Hence cultivation of medicinal plants can raise the capabilities of the poor. Cultivation of medicinal plants is labour intensive and well suited to the labour and resource base of this people. Thus systematic production and processing of medicinal plants can offer promising income and employment opportunities to the rural poor which will improve their livelihood (Singh and Swanson, 2000). Many medicinal plants can grow in loose soil under rainfall and moisture conditions. This will help to regenerate nature. Many species are shade tolerant while others are climbers, trees, shrubs and

herbs that can grow in different kinds of land and cropping systems.

RESURGENCE OF TRADITIONAL MEDICINE

The growing dissatisfaction of the people with western medicines due to its side effects and high price, has forced people to consider and renew their faith in traditional medicines especially Ayurveda. This trend is rapidly spreading over the years both in developed and developing countries. The demand for plant species used for health care needs are increasing at a rate of 8-15 percent per annum (Grunwald and Buttel, 1996). The WHO estimates support this view point. (WHO, 2002). This resurgence in traditional knowledge had led to increase in the large scale production of Ayurvedic medicines. This have further intensified the demand for medicinal plants. Easy and continuous supply of MAP's is one of the chief factors that determine the growth of the industry (Harilal, 2004).

Thus the development of Ayurvedic industry requires the support of a well developed medicinal plant market. Apart from this even in many of the modern medicines the basic composition is derived from plant base and these have become very well acceptable due to less side effects, low prices and

environment friendly attitude and lasting curative properties. This has also accounted to the growing increased use of medicinal plants.

ECONOMICS OF SMALL SCALE CULTIVATION

Small scale cultivation requires very less inputs and hence can be made more viable. This can raise household income to a considerable level. The cultivation of medicinal plants does not require huge investments in terms of irrigation and incurs less cost. Hence it is suitable for small farmers. The increased demand for medicinal plants can bring more revenue to the small farmers. Given the growing demand for MAPs and the impending loss it creates to the biodiversity the Government of India has passed the Foreign Trade Development and Regulation Act of 1992. This law and related legislation now requires that all companies should declare the source of their raw material and prohibits the export of 29 different plants. This legislation can add dignity to medicinal plant cultivators.

In Kerala, many leading Ayurvedic medicine manufactures have launched a concept of home gardens to propagate medicinal plants cultivation. This tie up ensures the farmers that the manufacturers will buy back the product from the household cultivators. By assuring a sure market this system will help the society in two ways - one by raising the income of the household by utilising their idle land holdings and secondly this will help the manufacturing units to get medicinal plants, though in small quantities. A large scale propagation of this system can minimise the problems involved in the procurement of medicinal plants to a considerable level.

EXPLICIT ADVANTAGES OVER TRADITIONAL CROPS

As compared to traditional crops the cultivation of medicinal crops offers some explicit

advantages. They are:

- Medicinal plant crops provide better returns to the cultivator than traditional crops.
- Have high demand within the country and outside the country and fetch back better prices in market
- In dry form they can be stored for a long time and can be sold when the prices are high
- Is largely drought tolerant and not easily grazed by animals
- Have low incidence of pest attack and diseases and less risk of price fluctuations
- Require less resources and hence the cost of cultivation is very low when compared with the traditional crops
- Can be raised as inter crop along with traditional crops even in degraded and marginal soils

Given these advantages the cultivation of medicinal plants are picking up in some areas. But the spread is not so large leading to deficiency in supply and thereby causing price hike and scarcity of medicinal plants. (Deshpande *et al.*, 2006).

DEMAND AND SUPPLY OF MEDICINAL PLANTS

For the efficient functioning of a market a well coordination of market forces of demand and supply is essential. In the case of medicinal plant market the major source of demand and supply come from a few agents who play a significant role in the control and regulation of the market. The estimated area under medicinal plant cultivation in India comes around two lakh hectares. Nearly 75 percent of plant species used by the Ayurvedic drug manufacturers in India are gathered from regenerating forests and wild habitat. The Indian system of medicine uses around 1,100 medicinal plants that are regularly collected from forest and around 60 species that are collected on demand (GOI, 2000). In this process, collectors are at the

grassroots level because they are the inhabitants living near the forest. Depending upon the economic importance of different NWFPs, marketing channels are created and regulated. Accordingly, all the products are classified into three groups depending upon their degree of use, as indicated below:

- Products restricted to local use (saleable only in the village market);
- Products of moderate commercial importance (saleable in bigger markets at district and state level); and
- Products of high commercial importance traded within the country and abroad.

The raw drugs are traditionally grouped as *Pettimarunnu* (medicines in box) and *Parimarunnu* (plucked medicines) (Sasidharan et al., 2000). The former consists of items used in the dried form which include several raw drugs obtained from North India also. *Parimarunnu* are used as fresh and are locally available items. According to a study done by FAO there are two sources of supply of medicinal plants 1) material collected from the wild and 2) material cultivated (FAO, 2003).

Wild harvesting means collection of medicinal herbs from the forest. This can be bark, leaves, branches, roots, fruits, herbs and wood. It can be collected from many sources such as open land, unused agricultural lands, roadsides and forestlands. Much of the materials traded today still are wild and only a few are cultivated. Herbal raw materials are collected by daily labourers. In India the tribal population is given the sole right to collect medicinal plants from the forest. Wild harvested medicinal plants are cheaper as it does not require infrastructure and investment. Many species used by the industry are required in small quantity and hence they are not economically viable to be cultivated. Again many plants need large area and hence they cannot be locally cultivated. Above all it is believed that wild herbs are

more superior to cultivated herbs as the former grows in a natural habitat. Cultivated materials are more suitable for large commercial uses of pharmacies and industrial houses. The manufacturers need guaranteed products that are of a given quality. Only cultivated materials can ensure this. These quality considerations are becoming increasingly useful due to the restriction imposed by authorities. The regulations like Good Manufacturing Practice (GMP)², Good Agricultural Practice (GAP), Good Agricultural and Collection Practices (GACP) etc. are followed in different countries. India, China, Argentina, Brazil, Hungary, Spain and Poland are the countries who have large cultivated source of medicinal plants (UNCTAD, 1982).

The cultivation of medicinal plants requires production of superior quality products at lowest possible cost. In most cases due to the high cost of land and the area of land needed, cultivation of medicinal plant is done under contract. Most of the large scale manufacturing units in Kerala have their own herbal gardens. AVS has the largest herbal garden in Kerala. Oushadi has a garden attached to its factory. Nagarjuna has a contractual garden system with local households. Normally they cultivate those plants that they use in large quantities or in the production of derivatives and isolations for which standardization is essential (FAO, 2003).

Cultivated material helps to mark reliable botanical identification; it helps to maintain quality standards and also facilitates controlled post harvest handling.

Given the continuous and steady demand for herbal products and depletion of wild habitat, the increase in large scale cultivation seems to be the only remedy for meeting the demand. But it is debated that the cultivated materials are treated as qualitatively inferior to the gathered specimen. For instance wild ginseng roots are considered to be 5-10 times more valuable than the roots produced by artificial propagation

(Schippmann *et al.*, 2002). Traditional medicine practitioners believe that the cultivated materials do not have the power of the material collected from the wild. Whatever be the debate between the wild and the cultivated it has to be accepted that the trade in medicinal plants are increasing.

After analysing the supply sources of medicinal plants it is essential to know from where the demand for these plants comes from. Medicinal plants are demanded sometimes as final commodities whereas in some other case as processed products. The demand is fast increasing as new products are derived from these products.

The pharmaceutical companies are the main source of demand for medicinal plants in the world. They use the medicinal plants for isolation of single purified drugs, in advanced extract form and for the development of other semi-synthetic pharmacologically active substances. The second source of demand comes from Phyto-pharmaceuticals companies who use plant extracts and plants as such as raw materials (Sophie, 2003). Further health supplement manufacturing companies, traditional medicine manufacturers and producers of alternative medicines (tribal medicines) use these medicinal plants. It is estimated that the world import of the vegetable material used in pharmacies by the different nations have increased phenomenally. India, Brazil and China are the largest exporters of the medicinal plants where India's contribution is less significant with ample scope for improvement. It is predicted that the medicinal and aromatic plants have a high market potential and the world demand for herbal products is increasing at seven percent per annum (Deshpande, 2002).

But one of the difficulties in assessing their importance both locally and globally is the lack of dependable information about their place of origin, their availability and distribution, how they are collected, when they are harvested, quantity involved

and the related trade statistics. Although there are some solid efforts at national and regional level undertaken in the recent years, but much information are unreliable.

The foregoing discussion has attempted to understand the emerging social and economic nexus between the Ayurvedic industry and medicinal plant trade. They are both complementary to each other. But supply chains between the cultivator and the final consumer of these medicinal plants are to be fine tuned for the larger interest of the industry and its sustainability.

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