

**SURVEY ON THE COMMERCIAL EXPLOITATION AND  
CONSUMPTION OF MEDICINAL PLANTS BY THE DRUG  
INDUSTRY IN NORTHERN KERALA**

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## ABSTRACT

The study was carried out to assess the consumption of raw drugs, their sources of supply and dependency on forests by Ayurvedic drug industry in northern Kerala. From 282 registered Ayurvedic medicine manufacturing units, 66 were randomly selected for gathering data. The selected units were classified as small, medium and large based on their annual turnover. Although, about 400 species of plants are used in the preparation of various medicines, only 140 raw drugs were selected for the present study. The annual consumption of 140 raw drugs is estimated to be 11,350 tonnes, of which 83 per cent is consumed by large units, 6 per cent by medium units and 11 per cent by small units. According to raw drug consumption, 16 items are over 200 tonnes, 21 items between 200 and 100 tonnes, 23 between 100 and 50 tonnes, 20 between 50 and 25 tonnes and 60 items between 25 and 10 tonnes.

The medicine manufacturing units get raw drugs collected from the forests, non-forests and through imports. Among the 140 raw drug items, 117 occur in Kerala and in the neighbouring states of Tamil Nadu and Karnataka; raw drugs collected from neighbouring states are also sold in Kerala. Based on the distribution of medicinal plants, the consumption of raw drugs collected from forests is 44.94 per cent, non-forest areas 14.31 per cent, cultivation 13.58 per cent and imports 7.39 per cent.

Analysis of geographical distribution of the medicinal plants reveals that as many as 29 species occur throughout the tropics, 20 species in the tropical regions of Asia, Pacific and Africa, 44 species in the Indo-Malesian region, 15 species extend to South East Asia while 19 species are restricted to South Asia and 8 species in the Temperate Himalayas-East Asia region. Only 5 species are restricted to Peninsular India. Species like *Pterocarpus santalinus*, *Coscinium fenestratum* and *Strobilanthes ciliatus* are considered as rare and threatened.

At present there is not much shortage of raw drugs belonging to the *Parimarunnu* (raw drugs used as fresh) category whereas there is shortage of *Pettimarunnu* (raw drugs used after drying) which include several items obtained from North India. Considering the growth of the Ayurvedic industry future demands for raw drugs can be met only through cultivation.

The study revealed that occasionally unrelated species are substituted for some of the preferred species of the raw drug. Non-availability of genuine raw drugs, mistaken identity, lack of expertise for identifying raw drugs and increase in the price are the main reasons for substitution, and also perhaps adulteration. A recent trend noticed is the sale of different qualities of the same raw drug due to the absence of standardization.

## INTRODUCTION

The origin of herbal medicine predates all existing records. India has a rich tradition in herbal medicine and the vedic literature stands proof for the vast knowledge on our traditional systems of medicine. A good number of medicinal plants are found mentioned in the ancient classical literature such as, *Charaka Samhitha*, *Susrata Samhita*, *Ashtanga Hridaya*, etc.

It is estimated that about 20,000 species of plants are used as source of medicines in the third world countries (Pushpangadan, 1999). In India, about 7000 species are used for medicine along with a few minerals, metals and animal products. Among the Indian systems of medicine, Ayurveda, the most prevalent system in the country, uses about 700 species of plants. Other systems like, *Sidha* uses 500 species of plants, *Unani* 400 species and *Emchi* or *Tibetan* system about 300 species. The Folklore systems play an important role in meeting the health care needs of the rural community in India and use more number of plants than in the Indian systems of medicine.

Kerala has a rich tradition in Ayurveda from very early period and contributed much to the development of this system of medicine. The Panchakarma therapy in Ayurveda is developed in Kerala as a part of Ayurvedic treatment and the well reputed Ayurvedic hospitals in India are in Kerala. Today, Ayurveda is nearly identified with Kerala. Apart from trained Ayurvedic doctors from institutions, there are a large number of registered as well as unregistered medical practitioners in the state. According to FRLHT, Bangalore there are 7000 A class and 6000 B class medical practitioners in Kerala (Pushpangadan *et al*, 1998). The number of unregistered medical practitioners (Folklore System) is about 5000. There are 750 licensed Ayurvedic medicine manufacturing units and about 1000 unregistered units in Kerala. These medicine manufacturing units as well as practitioners of Local Health Care System use a substantial quantity of medicinal plants and they are collected mostly from the wild.

About 450 raw drugs are used in the manufacture of 500 Ayurvedic medicines on a commercial basis. The annual trade in Ayurvedic medicines is about Rs.200 crore in Kerala. Among the raw drugs used, only 7 per cent is obtained from cultivated sources. Collection and trade of medicinal plants are highly complex in Kerala. Forests are the main source of raw drugs which are collected by the Tribes and Local Communities. The demand for drug plants is increasing every year. The increased demand has lead to the over exploitation of these valuable plants

resulting in depletion of many species from several forest areas. Though the demand for medicinal plants has been increasing every year, there is no reliable estimation on the quantity consumed by the medicine manufacturing units in the state. Government of Kerala (1976) and Ramanathan (1993) estimated the annual requirement of the medicinal plants for Ayurvedic Industry in Kerala. These estimates were not based on any systematic studies. There are no data on the source of medicinal plants, dependency on the forests, non-forest areas, cultivation, etc. In this context, the Wildlife Wing of Kerala Forest Department initiated steps to assess the consumption of medicinal plants in Kerala so as to find out the species collected from the forests, their consumption rate, the endemic medicinal plants as well as the rare and threatened species, so that the Forest Department can draw up programmes for conservation and sustainable utilisation of this valuable forest resource. Considering the quantum of work, the task of assessing consumption of medicinal plants in the southern districts of Kerala was given to the Tropical Botanical Garden and Research Institute (TBGRI), Palode, Thiruvananthapuram and for the northern districts to the Kerala Forest Research Institute (KFRI). TBGRI initiated the work in 1995 and submitted report in 1998. The survey of northern districts was awarded to KFRI in 1998. The study was carried out with the following objectives: i) to assess various species used in the manufacture of Ayurvedic medicines, ii) to estimate their annual consumption, iii) to gather information on sources of supply, iv) to assess dependency of medicinal plants from the forests, and v) to enlist species which have become rare and threatened due to over exploitation.

## **MATERIALS AND METHODS**

### **a. Survey**

A list of raw drugs used in the manufacture of various medicines for assessing their consumption in the medicine manufacturing units in the northern districts of Kerala, viz. Thrissur, Palakkad, Malappuram, Kozhikkode, Wayanad, Kannur and Kasaragode was prepared. The list of raw drugs is based on their widespread uses in the preparation of medicines as well as on the study carried out by TBGRI for the four southern districts of Kerala (Pushpangadan *et al*, 1998). Although, about 400 species of plants are used in the manufacture of medicines, only 140 species were selected for the present study as other items are either required in small quantities or not relevant with the objectives of the project. The collection and

trade of medicinal plants are highly complex in Kerala due to many reasons. First, most of the plants are collected from the wild by Tribes and Local Communities living near the forests. Although, agencies such as Tribal Service Co-operative Societies and their apex body, The Kerala State Scheduled Caste Scheduled Tribe Development Co-operative Federation Ltd. (Federation) are entrusted with the collection and marketing of Non-Wood Forest Products (NWFPs), which include medicinal plants, many NWFPs are collected and traded illegally by non-tribes. Secondly, non-tribes gather medicinal plants from homesteads and non-forest areas and sell them to different traders. Further, some of the medicinal plants are obtained from outside the state. Thus, gathering information on total quantity of medicinal plants collected from different sources directly is rather difficult. The quantity and items of medicinal plants consumed by the manufacturing units and local medical practitioners vary considerably. Ayurvedic pharmaceutical units consume 90 to 95 per cent of medicinal plants traded in the state. Thus, for the present study, data were gathered mainly from pharmaceutical units. The Ayurvedic medicine manufacturing units consist of both registered as well as unregistered. The number of registered units in Kerala is 750 and nearly 50 per cent among them are located in northern Kerala. As the nature, type and quantity of medicines produced by these units vary, the raw drugs and quantity consumed by these units by and large are different. Because of the complexity of the problem, this study is mainly confined to the registered medicine manufacturing units.

Both primary as well as secondary data have been used for the study. Primary data have been gathered from the registered units in Thrissur, Palakkad, Malappuram, Kozhikkode, Wayanad, Kannur and Kasaragode districts. A list of the Ayurvedic medicine manufacturing units in these districts has been collected from the office of the Kerala Ayurvedic Medicine Manufacturing Association (KAMMA), Thrissur (Appendix 1). From the 282 registered units in the these districts, 66 units were randomly taken for detailed study. The selected units were classified as small, medium and large based on their annual turnover, *ie* less than one crore (small), between 1 and 3 crores (medium) and more than 3 crores (large) [Table 1]. Data on the raw drugs consumption from the selected units were collected using the questionnaire method (Appendix II). In addition, some of the raw drug shops and agents involved in the trade were also contacted for further information on source of medicinal plants, price, etc. The data gathered were analysed to find the quantity of the 140 raw drugs consumed by the small, medium and large units in each district and the total consumption for the seven districts. The average consumption by small, medium and large units was also worked out.



**Table 1. Registered Ayurvedic Medicine Manufacturing Units in Northern Districts of Kerala and Number of Samples Selected**

<b>Districts</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>	<b>Total</b>
Thrissur	114 (8)	9 (5)	7 (2)	130 (15)
Palakkad	23 (6)	11 (4)	3 (3)	37 (13)
Malappuram	28 (7)	7 (4)	3 (2)	38 (13)
Kozhikkode	22 (6)	7 (3)	3 (1)	32 (10)
Wayanad	3 (2)	0	0	3 (2)
Kannur	29 (5)	6 (3)	3 (3)	38 (11)
Kasaragode	3 (2)	1 (0)	0	4 (2)
<b>Total</b>	<b>222 (36)</b>	<b>41 (19)</b>	<b>19 (11)</b>	<b>282 (66)</b>

- Figures in parenthesis are number of samples

### **b. Source of Medicinal Plants**

The raw drugs consist of roots, rhizomes, leaves, flowers, fruits, seeds, seed oil, gums and resins, bark and wood or whole plants. The raw drugs are traditionally grouped as *Pettimarunnu* and *Parimarunnu*. The former consists of items used in the dried form which include several raw drugs obtained from North India. *Parimarunnu* are used as fresh and are locally available items. The medicine manufacturing units are getting raw drugs by inviting tender for the supply, purchase from raw drug shops, supplied by agencies and from local collectors. Large units obtain their raw drugs mostly by inviting tender for supplying the quantity required annually. They also do local purchase of *Parimarunnu* items. Oushadi, the Ayurvedic medicine manufacturing unit under Government sector is purchasing raw drugs through tender method and very little quantity is purchased from the Tribal Service Co-operative Societies. Certain large units employ collection agents to get raw drugs. The small units mostly purchase from dealers and from local collectors. Sales representatives do visit manufacturing units to canvas orders for items, especially those obtained from North India and supply them on a negotiated price.

There are two weekly markets for the sale of raw drugs at Vadakara in Kozhikkode district and Velanthavalam in Palakkad district. The raw drugs brought by the collectors are sold in auction through commission agents. The raw drug dealers as

well as medicine manufacturing units participate in the auction. Another organised sale of raw drugs (under NWFPs/MFPs) is through the Federation and Tribal Service Co-operative Societies. The societies sell raw drugs at a price fixed by the Minor Forest Produce (MFP) Committee each year. The present MFP list includes 111 items of which 80 are raw drugs. The societies are selling raw drugs that are included in the MFP list. Other raw drugs collected by the society members are sold to outsiders.

Among the 140 raw drugs taken up for assessing their annual consumption, 16 species are obtained from cultivated sources, 59 species from forest areas, 27 species from non-forest areas and 29 species from forests as well as non-forest areas. Nine species are obtained from outside Kerala, mostly from North India (Table 2).

### **c. Botanical Identity of Raw Drugs**

The correct botanical name and important synonyms of the 140 raw drugs were worked out after examining samples collected from the manufacturing units. Literature referred for fixing the identity of raw drugs include (Nadkarni, 1954; Chopra *et al*, 1956; Nambiar *et al*, 1985; Warriar *et al*, 1994-96; Sivarajan and Indira Balachandran, 1994). The Ayurvedic raw drugs and live collection of medicinal plants maintained in the Institute were also made use in fixing the identity of raw drugs. It is found that in some cases more than one species are used as the source of a raw drug. This is very evident in the case of *Orila*, *Moovila*, *Kattupayar*, *Kaippanpadavalam*, *Kurumthotti*, etc. *Pseudarthria viscida* is the preferred source of moovila, however it was found that roots of *Desmodium pulchellum*, *Rhynchosia rufescens*, *Desmodium heterocarpon* and *Uraria hamosa* were also used as Moovila.

The medicine manufacturing units always insist for the species they prefer as the source of raw drugs. But, when supply is in large quantities, checking each and every sample is practically difficult especially those of dried root and bark. In the case of herbaceous raw drugs used as fresh, it is not difficult to ascertain the identity of the drug plant. Though root is the preferred part of “dashamoola”, due to scarcity, wood is widely used. Cost of raw drug is another reason for substitution. A recent trend noticed in the raw drugs trade is the sale of different qualities of the same drug, consisting of cheaper substitutes. The cost of the substitutes is often determined by the dealer depending on the customer. *Holostemma ada-kodien*, the accepted source of Adapathiyam, is being substituted with cheaper “Adapathiyam”

**Table 2. Raw Drugs Obtained From Different Sources**

<b>Forest Areas</b>			
Sathavari	Nellikka	Chittamruthu	Kadukka
Cheruvazhuthana	Karinkurinji	Njerinjal	Veppu
Moovila	Orila	Kumizhu	Munja
Pathiriveru	Thanikka	Palakappayyani	Kattupadavalam
Karingali	Kanikkonna	Maramanjil	Puthirichunda
Avaltholi	Vengakathal	Pachotti	Neermaruthintholi
Ungu	Cheruthekkku	Poovathu	Chandanam
Kattuthippali	Padakizhangu	Naikkorana	Neermathalatholi
Changalamparanda	Nagadhanthiveru	Athitholu	Kattuvellari
Kattupayar	Akil	Kattumudira	Perinkurumbaveru
Kattuzhunnu	Aadukottapala	Parvallikizhangu	Athithippali
Cherupunnayari	Kallurvanji	Kakkathondi	Kazhinji
Peenari	Karthottiveru	Somalatha	Chitteenthalveru
Attuvanji	Kasthurimanjal	Chittelam	Garudakodi
Channakizhangu	Nanmukapullu	Ilanjipoovu	
<b>Non-forest Areas</b>			
Muthanga	Thathiri	Adalodakam	Kattarvazha
Brahmi	Pathimugham	Karuka	Prasarani
Vayalchulli	Pookaitha	Arayal	Peral
Dharbhaveru	Attudharbha	Kiriyath	Thekkadaveru
Puliyarila	Thamarayalli	Thamaravalayam	Muthil
Shangupushpam	Ambalkizhangu	Chonakapullu	Karinkoovalam
Thumbayila	Agori	Karinthali	
<b>Forest as well as Non-forest Areas</b>			
Kurunthotti	Neelayamari	Kanjunni	Thazhuthama
Parpidakapullu	Koduthoova	Naruneendi	Cherula
Palmuthuku	Uzhinja	Kudakappala	Nilappana
Keezharnelli	Adapathiyam	Ezhilampala	Karuvapatta
Ummam	Erukku	Tharthaval	Njaval
Thechiveru	Njerinjampuli	Kadaladi	Poovankurunthal
Perumaratholi	Ponnaveera	Thottavadi	Thiruthali
Vishnukranthi			
<b>Cultivation</b>			
Chukku	Koovalam	Avanakku	Koduveli
Chuvannaratha	Manjal	Vayambu	Iruveli
Kachuri	Ashokatholi	Karinochi	Chittaratha
Thakkolam	Pachila	Chengazhineer-kizhangu	Chunnamukkiyila
<b>North India</b>			
Amukkuram	Devatharam	Thippali	Rakthachandanam
Aiamodakam	Karkidakashringhi	Sheerakakoli	Arenukam
Karkoli			

from Andhra Pradesh, *Decalepis hamiltonii*. Similarly, cheaper substitute of Narunandi, known as Bombay Narunandi is freely available in the market. The raw drug dealers think that they are the authority on the authenticity of the raw drugs and manufactures often believe them and accept whatever is supplied.

There are instances of regional availability influencing identity of raw drugs. In Kerala *Coscinium fenestratum* (Maramanjil) is the preferred source of Dharuharidra, while *Berberis tinctoria* and *B. aristata* are accepted as Dharuharidra in North India. Sometimes *Mahonia leschenaultii* occurring in South India is also substituted for Dharuharidra. Similarly *Coffea travancorensis* (Rubiaceae) is accepted as Pushkaram in Kerala while in North India *Inula racemosa* (Asteraceae) is used as Pushkaram.

Non-availability of genuine drugs, mistaken identity, indiscriminate naming, biased interpretation of Sanskrit names, lack of expertise in identifying raw drugs and increasing price are the main reasons for substitution of raw drugs. When we take into account the substitute drugs also, the actual number of raw drugs used in the medicine manufacturing will go beyond the estimated 400 species. However, in the present study, the widely accepted species are chosen as the source of raw drugs and their botanical names, local names and families are given in Table 3.

**Table 3. Botanical Names, Local Names and Families of the Raw Drugs**

<b>Local Name</b>	<b>Botanical Name</b>	<b>Family</b>
Aattukottapala	<i>Aristolochia bracteolata</i> Lam.	Aristolochiaceae
Adalodakam	<i>Adhatoda zeylanica</i> Medic. ( <i>Adhatoda vasica</i> Nees)	Acanthaceae
Adapathiyam	<i>Holostemma ada-kodien</i> Schult. ( <i>Holostemma annulare</i> (Roxb.) K. Schum.)	Asclepiadaceae
Agori	<i>Flacourtia indica</i> (Burm. f.) Merr.	Flacourtiaceae
Aiamodakam	<i>Trachispermum roxburghiana</i> (DC.) Craib	Apiaceae
Akil	<i>Dysoxylum malabaricum</i> Bedd. ex Hiern	Meliaceae
Ambalkizhangu	<i>Nymphaea pubescens</i> Willd.	Nymphaeaceae
Amukkuram	<i>Withania somnifera</i> (L.) Dunal	Solanaceae
Arayal	<i>Ficus religiosa</i> L.	Moraceae
Arenukam	<i>Corchorus trilocularis</i> L.	Tiliaceae
Ashokatholi	<i>Saraca asoca</i> (Roxb.) de Wilde ( <i>Saraca indica</i> auct. non L.)	Caesalpiniaceae
Athithippali	<i>Balanophora fungosa</i> J. R. & G. Forst.	Balanophoraceae

<b>Local Name</b>	<b>Botanical Name</b>	<b>Family</b>
Athitholu	<i>Ficus racemosa</i> L. ( <i>Ficus glomerata</i> Roxb.)	Moraceae
Attudharbha	<i>Typha angustata</i> Bory & Chaub.	Poaceae
Attuvanji	<i>Salix tetrasperma</i> Roxb.	Salicaceae
Avaltholi	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Ulmaceae
Avanakku	<i>Ricinus communis</i> L.	Euphorbiaceae
Brahmi	<i>Bacopa monnieri</i> (L.) Pennell ( <i>Moniera cuneifolia</i> Michaux)	Scrophulariaceae
Chandanam	<i>Santalum album</i> L.	Santalaceae
Changalamparanda	<i>Cissus quadrangularis</i> L.	Vitaceae
Channakizhangu	<i>Costus speciosus</i> (Koenig) Smith	Zingiberaceae
Chengazhineer- kizhangu	<i>Kaempferia rotunda</i> L.	Zingiberaceae
Cherula	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae
Cherupunnayari	<i>Celastrus paniculatus</i> Willd.	Celastraceae
Cheruthekku	<i>Clerodendrum serratum</i> (L.) Moon	Verbenaceae
Cheruvazhuthana	<i>Solanum anguivi</i> Lam.	Solanaceae
Chittamruthu	<i>Tinospora cordifolia</i> (Willd.) Hook.f.&Thoms.	Menispermaceae
Chittaratha	<i>Alpinia calcarata</i> Rosc.	Zingiberaceae
Chitteenthalveru	<i>Phoenix loureirii</i> Kunth	Arecaceae
Chittelam	<i>Heracleum ringes</i> Wall. ex DC.	Apiaceae
Chonakapullu	<i>Cymbopogon citratus</i> (DC.) Stapf	Poaceae
Chukku	<i>Zingiber officinale</i> Rosc.	Zingiberaceae
Chunnamukkiyila	<i>Cassia senna</i> L.	Caesalpiniaceae
Chuvannaratha	<i>Alpinia</i> sp.	Zingiberaceae
Devatharam	<i>Cedrus deodara</i> (Roxb. ex D. Don) G. Don	Pinaceae
Dharbhaveru	<i>Desmostachya bipinnata</i> (L.) Stapf	Poaceae
Erukku	<i>Calotropis gigantea</i> (L.) R. Br.	Asclepiadaceae
Ezhilampala	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae
Garudakodi	<i>Aristolochia indica</i> L.	Aristolochiaceae
Ilanjipoovu	<i>Mimusops elengi</i> L.	Sapotaceae
Iruveli	<i>Coleus zeylanicus</i> (Benth.) Cramer	Lamiaceae
Kachuri	<i>Kaempferia galanga</i> L.	Zingiberaceae
Kadaladi	<i>Achyranthes aspera</i> L.	Amaranthaceae
Kadukka	<i>Terminalia chebula</i> Retz.	Combretaceae
Kakkathondi	<i>Trichosanthes tricuspidata</i> Lour.	Cucurbitaceae

<b>Local Name</b>	<b>Botanical Name</b>	<b>Family</b>
Kallurvanji	<i>Rotula aquatica</i> Lour.	Boraginaceae
Kanikkonna	<i>Cassia fistula</i> L.	Caesalpiniaceae
Kanjunni	<i>Eclipta prostrata</i> (L.) L.	Asteraceae
Karimthakali	<i>Solanum nigrum</i> L.	Solanaceae
Karingali	<i>Acacia catechu</i> (L.f.) Willd.	Mimosaceae
Karinkoovalam	<i>Monochoria vaginalis</i> (Burm. f.) Presl	Pontederiaceae
Karinkurinji	<i>Strobilanthes ciliatus</i> Nees	Acanthaceae
Karinochi	<i>Vitex negundo</i> L.	Verbenaceae
Karkidakashringhi	<i>Pistacia chinensis</i> Bunge ssp. <i>integerrima</i> (Stewart) Reichb. f.	Anacardiaceae
Karkoli	<i>Fritillaria roylei</i> Hook.f.	Liliaceae
Karthottiveru	<i>Hugonia mystax</i> L.	Linaceae
Karuka	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae
Karuvapatta	<i>Cinnamomum verum</i> Presl. ( <i>Cinnamomum zeylanicum</i> Blume)	Lauraceae
Kasthurimanjal	<i>Curcuma aromatica</i> Salisb.	Zingiberaceae
Kattarvazha	<i>Aloe barbadensis</i> Mill.	Liliaceae
Kattumudira	<i>Cassia absus</i> L.	Caesalpiniaceae
Kattupadavalam	<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae
Kattupayar	<i>Vigna pilosa</i> (Roxb.) Baker	Fabaceae
Kattuthippali	<i>Piper longum</i> L.	Piperaceae
Kattuvellari	<i>Citrullus colocynthis</i> (L.) Schrader	Cucurbitaceae
Kattuzhunnu	<i>Vigna radiata</i> (L.) Wilczek ssp. <i>sublobata</i> (Roxb.) Verdc.	Fabaceae
Kazhinji	<i>Caesalpinia bonduc</i> (L.) Roxb. ( <i>Caesalpinia crista</i> auct. non L.)	Caesalpiniaceae
Keezharnelli	<i>Phyllanthus amarus</i> Schum. & Thonn. ( <i>Phyllanthus niruri</i> auct. non L.)	Euphorbiaceae
Kiriyath	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees	Acanthaceae
Koduthoova	<i>Tragia involucrata</i> L.	Euphorbiaceae
Koduveli	<i>Plumbago indica</i> L.	Plumbaginaceae
Koovalam	<i>Aegle marmelos</i> (L.) Correa	Rutaceae
Kudakappala	<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex G. Don ( <i>Holarrhena antidysenterica</i> (Roth) A. DC.)	Apocynaceae
Kumizhu	<i>Gmelina arborea</i> Roxb.	Verbenaceae

<b>Local Name</b>	<b>Botanical Name</b>	<b>Family</b>
Kurunthotti	<i>Sida rhombifolia</i> L. ssp. <i>retusa</i> (L.) Borss.	Malvaceae
Manjal	<i>Curcuma longa</i> L.	Zingiberaceae
Maramanjai	<i>Cosciniium fenestratum</i> (Gaertn.) Colebr.	Menispermaceae
Moovila	<i>Pseudarthria viscida</i> (L.) Wight & Arn.	Fabaceae
Munja	<i>Premna serratifolia</i> L.	Verbenaceae
Muthanga	<i>Cyperus rotundus</i> L.	Cyperaceae
Muthil	<i>Centella asiatica</i> (L.) Urban	Apiaceae
Nagadhanthiveru	<i>Baliospermum montanum</i> (Willd.) Muell.-Arg.	Euphorbiaceae
Naikkorana	<i>Mucuna pruriens</i> (L.) DC.	Fabaceae
Nanmukapullu	<i>Actiniopteris dichotoma</i> Bedd.	Polypodiaceae
Naruneendi	<i>Hemidesmus indicus</i> (L.) R.Br.	Asclepiadaceae
Neelayamari	<i>Indigofera tinctoria</i> L.	Fabaceae
Neermaruthintholi	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae
Neermathalatholi	<i>Crataeva magna</i> (Lour.) DC. ( <i>Crataeva religiosa</i> auct. non G Forst.)	Capparaceae
Nellikka	<i>Phyllanthus emblica</i> L. ( <i>Embllica officinalis</i> Gaertn.)	Euphorbiaceae
Nilappana	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae
Njaval	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae
Njerinjampuli	<i>Solena amplexicaulis</i> (Lam.) Gandhi	Cucurbitaceae
Njerinjil	<i>Tribulus terrestris</i> L.	Zygophyllaceae
Orila	<i>Desmodium gangeticum</i> (L.) DC.	Fabaceae
Pachila	<i>Cinnamomum tamala</i> (Buch.-Ham.) Nees	Lauraceae
Pachotti	<i>Symplocos cochinchinensis</i> (Lour.) Moore ssp. <i>laurina</i> Nooteb.	Symplocaceae
Padakizhangu	<i>Cyclea peltata</i> (Lam.) Hook. f. & Thoms.	Menispermaceae
Palakappayyani	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz	Bignoniaceae
Palmuthuku	<i>Ipomoea mauritiana</i> Jacq.	Convolvulaceae
Parpidakapullu	<i>Hedyotis corymbosa</i> (L.) Lam. ( <i>Oldenlandia corymbosa</i> L.)	Rubiaceae
Parvallikizhangu	<i>Ichnocarpus frutescens</i> (L.) R. Br.	Apocynaceae
Pathimugham	<i>Caesalpinia sappan</i> L.	Caesalpinaceae
Pathiriveru	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillw.) Mabber. ( <i>Stereospermum tetragonum</i> DC.)	Bignoniaceae

<b>Local Name</b>	<b>Botanical Name</b>	<b>Family</b>
Peenari	<i>Celtis philippensis</i> Blanco var. <i>wightii</i> (Planch.) Soep.	Ulmaceae
Peral	<i>Ficus benghalensis</i> L.	Moraceae
Perinkurumbaveru	<i>Chonemorpha fragrans</i> (Moon) Alston ( <i>Chonemorpha macrophylla</i> (Roxb.) G. Don)	Apocynaceae
Perumaratholi	<i>Ailanthus triphysa</i> (Dennst.) Alston ( <i>Ailanthus malabarica</i> DC.)	Simaroubaceae
Ponnaveera	<i>Cassia occidentalis</i> L.	Caesalpiniaceae
Pookaitha	<i>Pandanus fascicularis</i> Lam. ( <i>P. tectorius sensu</i> Fischer)	Pandanaceae
Poovankurunthal	<i>Vernonia cinerea</i> (L.) Less.	Asteraceae
Poovathu	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae
Prasarani	<i>Merremia tridentata</i> (L.) Hall.f. ssp. <i>hastata</i> (Desr.) Ost.	Convolvulaceae
Puliyarila	<i>Oxalis corniculata</i> L.	Oxalidaceae
Puthirichunda	<i>Solanum torvum</i> Sw.	Solanaceae
Rakthachandanam	<i>Pterocarpus santalinus</i> L. f.	Fabaceae
Sathavari	<i>Asparagus racemosus</i> Willd.	Liliaceae
Shangupushpam	<i>Clitoria ternatea</i> L.	Fabaceae
Sheerakakoli	<i>Lilium polyphyllum</i> D. Don	Liliaceae
Somalatha	<i>Sarcostemma acidum</i> (Roxb.) Voigt	Asclepiadaceae
Thakkolam	<i>Illicium verum</i> Hook. f.	Illiciaceae
Thamaravalayam	<i>Nelumbo nucifera</i> Gaertn.	Nymphaeaceae
Thamarayalli	<i>Nelumbo nucifera</i> Gaertn.	Nymphaeaceae
Thanikka	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae
Tharthaval	<i>Spermacoce articularis</i> L. f. ( <i>Borreria articularis</i> (L.f.) F.N. Will.)	Rubiaceae
Thathiri	<i>Woodfordia fruticosa</i> Kurz	Lythraceae
Thazhuthama	<i>Boerhavia diffusa</i> L.	Nyctaginaceae
Thechiveru	<i>Ixora coccinea</i> L.	Rubiaceae
Thelkadaveru	<i>Heliotropium indicum</i> L.	Boraginaceae
Thippali	* <i>Piper chaba</i> Hunt.	Piperaceae
Thiruthali	<i>Ipomoea sepiaria</i> Roxb.	Convolvulaceae
Thottavadi	<i>Tragia involucrata</i> L.	Euphorbiaceae
Thumbayila	<i>Leucas aspera</i> (Willd.) Spreng.	Lamiaceae

\* Fruits of *Piper chaba* is the preferred source of thippali. Fruits of *P. longum* is also used.



<b>Local Name</b>	<b>Botanical Name</b>	<b>Family</b>
Ummam	<i>Datura metel</i> L.	Solanaceae
Ungu	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae
Uzhinja	<i>Cardiospermum halicacabum</i> L.	Sapindaceae
Vayalchulli	<i>Hygrophila schulli</i> (Ham.) M.R. & S.M. Almeida ( <i>Asteracantha longifolia</i> (L.) Nees)	Acanthaceae
Vayambu	<i>Acorus calamus</i> L.	Araceae
Vengakathal	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae
Veppu	<i>Azadirachta indica</i> A. Juss.	Meliaceae
Vishnukranthi	<i>Evolvulus alsinoides</i> (L.) L.	Convolvulaceae

## **RESULTS AND DISCUSSION**

The study resulted in generating several relevant information which could be used for further studies in the management and utilization of the medicinal plant resources for the medicine manufacturing industry in Kerala. The annual consumption of 140 raw drugs in the medicine manufacturing units in northern Kerala has been worked out. The data were further analysed to find out the consumption of raw drugs by the small, medium and large units in each of the seven districts. Kurunthotti and Nellikai are the most heavily consumed raw drugs. Among the selected districts, consumption of raw drugs is found to be the highest in Thrissur and Malappuram districts, as some of the large manufacturing units are located in these districts.

Annual consumption of raw drugs indicates that 16 items are over 200 tonnes; 21 items between 200-100 tonnes; 23 items between 100-50 tonnes; 20 items between 50-25 tonnes and 60 items between 25-10 tonnes (Table 4). Annual consumption of raw drugs in the seven districts and average for each district is given in Table 5. Consumption of raw drugs by the small units, medium units and large units is separately assessed for each district (Table 6, 7 and 8). There is marked variation with regard to consumption of other raw drugs in small, medium and large units, as the quantity and type of medicines prepared by them differ. Annual consumption with regard to plant/parts viz., roots/tubers/rhizomes constitutes 49.67 per cent of the total quantity. Fruits and seeds constitute 15.11 per cent, followed by wood 11.87 per cent; whole plants (herbs) 9.47 per cent; bark 7.36 per cent; leaves 3.88 per cent and flowers 2.62 per cent (Fig. 1 and Table 9).

**Table 4. Frequency of Raw Drugs According to Annual Consumption and Their Geographical Distribution**

<b>Local Names</b>	<b>Distribution</b>	<b>Local Names</b>	<b>Distribution</b>
<b>Over 200 tonnes</b>			
Kurunthotti	Pantropical	Thathiri	Paleotropics
Nellikka	Paleotropics	Karinkurinji	Peninsular India
Chittamruthu	South & S. E. Asia	Koovalam	Indo-Malesia
Kadukka	South & S. E. Asia	Kanjunni	Pantropical
Chukku	Pantropical	Adalodakam	Indo-Malesia
Sathavari	Paleotropics	Amukkuram	Paleotropics
Muthanga	Pantropical	Kattarvazha	Pantropical
Cheruvazhuthana	Indo-Malesia	Devatharam	Himalayas-E. Asia
<b>Between 200-100 tonnes</b>			
Njerinjil	Pantropical	Pathiriveru	Indo-Malesia
Thippali	Himalayas - E. Asia	Thanikka	Indo-Malesia
Veppu	South & S. E. Asia	Parpidakapullu	Pantropical
Moovila	Indo-Malesia	Palakappayyani	Indo-Malesia
Orila	Indo-Malesia	Kodithoova	South & S. E. Asia
Thazhuthama	Pantropical	Neelayamari	Pantropical
Avanakku	Pantropical	Brahmi	Paleotropics
Koduveli	South & S. E. Asia	Rakthachandanam	Peninsular India
Kumizhu	Indo-Malesia	Pathimugham	South & S. E. Asia
Chuvannaratha	Himalayas- E. Asia	Manjal	Pantropical
Munja	South & S. E. Asia		
<b>Between 100-50 tonnes</b>			
Kattupadavalam	Indo-Malesia	Avaltholi	Indo-Malesia
Naruneendi	South Asia	Vengakathal	South Asia
Karingali	South & S. E. Asia	Karuka	Pantropical
Kanikkonna	South & S. E. Asia	Kudakappala	Indo-Malesia
Maramanjil	Indo-Malesia	Aiamodakam	Indo-Malesia
Cherula	Pantropical	Pachotti	Indo-Malesia
Vayambu	Indo-Malesia	Neermaruthintholi	South Asia
Palmuthuku	Pantropical	Nilappana	Indo-Malesia
Puthirichunda	Pantropical	Ungu	Indo-Malesia
Uzhinja	Pantropical	Ashokatholi	South Asia
Iruveli	South Asia	Cheruthekku	Indo-Malesia
Kachuri	Indo-Malesia		
<b>Between 50-25 tonnes</b>			
Poovathu	Indo-Malesia	Pookaitha	South Asia
Karinochi	Paleotropics	Neermathalatholi	South Asia
Chandanam	South Asia	Ezhilampala	Indo-Malesia

<b>Local Names</b>	<b>Distribution</b>	<b>Local Names</b>	<b>Distribution</b>
Kattuthippali	Indo-Malesia	Changalamparanda	Indo-Malesia
Prasarani	Paleotropics	Arayal	South & S. E. Asia
Padakizhangu	South & S. E. Asia	Nagadhanthiveru	Indo-Malesia
Vayalchulli	South & S. E. Asia	Karuvapatta	Indo-Malesia
Keezharnelli	Pantropical	Peral	South & S. E. Asia
Adapathiyar	South & S. E. Asia	Athitholi	Indo-Malesia
Naikkorana	South Asia	Kattuvellari	South Asia
<b>Below 25 tonnes</b>			
Dharbhaveru	Paleotropics	Muthil	Paleotropics
Kattupayar	South Asia	Kakkathondi	Indo-Malesia
Akil	Peninsular India	Shangupushpam	Pantropical
Kattumudira	Pantropical	Kazhinji	Paleotropic
Ummam	Pantropical	Peenari	Indo-Malesia
Perinkurumbaveru	South & S. E. Asia	Sheerakakoli	Himalayas-E. Asia
Kattuzhunnu	Indo-Malesia	Poovankurunthal	Indo-Malesia
Erikku	Paleotropics	Karthottiveru	South Asia
Chittaratha	Indo-Malesia	Perumaratholi	Indo-Malesia
Tharthaval	Paleotropics	Arenukam	South Asia
Attudharbha	Paleotropics	Karkoli	Himalayas-E. Asia
Njaval	Indo-Malesia	Somalatha	South Asia
Kiriyath	South Asia	Chitteenthalveru	South & S. E. Asia
Thakkolam	Himalayas - E. Asia	Attuvanji	Indo-Malesia
Aattukottapala	Paleotropics	Kasthurimanjal	South Asia
Palvellakizhangu	Indo-Malesia	Ponnaveera	Pantropical
Pachila	Himalayas -E. Asia	Chittelam	Peninsular India
Thechiveru	Peninsular India	Thottavadi	Pantropical
Athithippali	Indo-Malesia	Ambalkizhangu	Indo-Malesia
Thekdaiveru	Pantropical	Garudakodi	Indo-Malesia
Karkidakashringhi	Himalayas-E. Asia	Chonakapullu	Pantropical
Chengazhineer-kizhangu	Indo-Malesia	Karinkoovalam	Paleotropics
Njerinjampuli	Indo-Malesia	Thumbayila	Paleotropics
Cherupunnayari	Indo-Malesia	Channakizhangu	Indo-Malesia
Puliyarila	Pantropical	Nanmukapullu	South Asia
Thamarayalli	Paleotropics	Thiruthali	Paleotropic
Kadaladi	Pantropical	Agori	Paleotropic
Thamaravalayam	Paleotropics	Vishnukranthi	Pantropical
Chunnamukkiyila	Paleotropics	Karinthali	Paleotropic
Kallurvanji	Pantropical	Ilanjipoovu	Indo-Malesia

**Table 5. Annual Consumption of Raw Drugs by the Medicine Manufacturing Units in the Northern Districts of Kerala and Their Average (kg)**

Name	Thrissur		Palakkad		Malappuram		Kozhikkode		Wayand		Kannur		Kasaragode		North Kerala	
	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg
Kurunthotti	281200	2163	83981	2270	238285	6271	74784	2337	4050	1350	14591	384	50	13	696941	2471
Sathavari	107686	828	35746	966	123835	3259	9916	310	1020	340	9643	254	273	68	288119	1022
Neelamari	21438	165	12112	327	63052	1659	11250	352	300	100	3340	88	0	0	111491	395
Nellikka	221905	1707	25662	694	228625	6016	74854	2339	1455	485	12326	324	322	81	565150	2004
Chittamruthu	256390	1972	34655	937	156770	4126	19429	607	1125	375	11515	303	150	38	480033	1702
Kadukka	219343	1687	29864	807	103130	2714	12127	379	405	135	8793	231	185	46	373847	1326
Chukku	203685	1567	23078	624	71933	1893	17472	546	300	100	3399	89	557	139	320424	1136
Muthanga	158760	1221	18264	494	53858	1417	32737	1023	750	250	4139	109	500	125	269007	954
Cheruvazhuthana	82099	632	14157	383	117388	3089	33112	1035	675	225	5189	137	93	23	252712	896
Thathiri	110350	849	16113	435	73310	1929	34004	1063	1050	350	5880	155	640	160	241347	856
Karinkurinji	70170	540	29536	798	117035	3080	17614	550	1005	335	5313	140	25	6	240697	854
Koovalam	86573	666	20403	551	103395	2721	12393	387	825	275	5610	148	365	91	229564	814
Kanjunni	55821	429	32815	887	124503	3276	6619	207	413	138	6213	164	100	25	226483	803
Adalodakam	107814	829	18833	509	65238	1717	25126	785	1425	475	5984	157	1830	458	226250	802
Amukkuram	112913	869	17742	480	73823	1943	17297	541	375	125	1982	52	216	54	224348	796
Kattarvazha	112976	869	14134	382	77558	2041	4726	148	1275	425	4495	118	50	13	215213	763
Devatharam	113794	875	15295	413	64143	1688	11038	345	375	125	2169	57	50	13	206864	734
Njerijal	81133	624	17555	474	73833	1943	11937	373	683	228	6159	162	453	113	191752	680
Thippali	90545	697	11413	308	50226	1322	17593	550	428	143	5569	147	244	61	176017	624
Veppu	116268	894	8855	239	27074	712	17235	539	713	238	3199	84	132	33	173476	615
Moovila	76944	592	14346	388	58108	1529	11705	366	1005	335	5559	146	406	102	168073	596
Orila	73407	565	14896	403	58100	1529	11586	362	1005	335	5559	146	406	102	164959	585

Name	Thrissur		Palakkad		Malappuram		Kozhikkode		Wayand		Kannur		Kasaragode		North Kerala	
	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg
Thazhuthama	79346	610	14957	404	55553	1462	3352	105	488	163	3879	102	72	18	157646	559
Avanakku	68258	525	24538	663	36570	962	19987	625	1313	438	5680	149	231	58	156577	555
Koduveli	79600	612	12597	340	47775	1257	9223	288	1095	365	4912	129	160	40	155362	551
Kumizhu	70588	543	14410	389	52308	1377	3440	108	675	225	8260	217	365	91	150046	532
Chuvannaratha	71262	548	11444	309	43389	1142	17398	544	75	25	3206	84	0	0	146774	520
Munja	47983	369	14119	382	57915	1524	11347	355	225	75	5056	133	300	75	136945	486
Pathiriveru	48534	373	13554	366	50695	1334	11737	367	675	225	5194	137	325	81	130714	464
Thanikka	65077	501	9276	251	37605	990	11261	352	405	135	6330	167	185	46	130139	461
Parpidakapullu	90399	695	5786	156	21868	575	4342	136	195	65	2862	75	32	8	125484	445
Palakapayyani	48109	370	13670	369	52195	1374	3888	122	675	225	5394	142	340	85	124271	441
Koduthoova	66652	513	8141	220	29440	775	7359	230	405	135	4470	118	5	1	116473	413
Brahmi	38199	294	9991	270	45423	1195	10710	335	323	108	2782	73	225	56	107651	382
Rakthachandanam	79554	612	2419	65	11441	301	10146	317	180	60	1434	38	92	23	105265	373
Pathimugham	76695	590	4498	122	10400	274	10247	320	825	275	1728	45	50	13	104442	370
Manjal	49201	378	8819	238	38639	1017	3740	117	233	78	2080	55	177	44	102889	365
Kattupadavalam	58976	454	7870	213	21111	556	3583	112	323	108	3742	98	20	5	95624	339
Naruneendi	21018	162	9774	264	50040	1317	10190	318	195	65	3119	82	135	34	94471	335
Karingali	41501	319	9186	248	22468	591	11824	370	225	75	6886	181	361	90	92450	328
Kanikkonna	45063	347	3449	93	32657	859	8210	257	195	65	2500	66	0	0	92074	327
Maramangal	56429	434	5752	155	16685	439	10718	335	345	115	1861	49	100	25	91889	326
Cherula	59928	461	12304	333	13233	348	5072	158	60	20	923	24	22	6	91542	325
Vayambu	59154	455	5103	138	18749	493	4373	137	263	88	2233	59	0	0	89875	319
Palmuthuku	22570	174	5933	160	37868	997	10273	321	810	270	3730	98	0	0	81183	288
Putharichunda	56633	436	4687	127	6297	166	10397	325	338	113	2501	66	81	20	80932	287

Name	Thrissur		Palakkad		Malappuram		Kozhikkode		Wayand		Kannur		Kasaragode		North Kerala	
	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg
Uzhinja	9262	71	4768	129	54068	1423	9806	306	60	20	2265	60	15	4	80243	285
Iruveli	57767	444	2412	65	10752	283	2086	65	278	93	1798	47	55	14	75146	266
Kachuri	43032	331	6258	169	18458	486	4797	150	180	60	2170	57	0	0	74896	266
Avaltholi	39385	303	3416	92	19748	520	9878	309	113	38	1823	48	0	0	74362	264
Vengakadal	15489	119	6944	188	34575	910	10277	321	660	220	2235	59	0	0	70181	249
Karuka	20478	158	7770	210	31248	822	9712	303	15	5	880	23	0	0	70103	249
Kudavappala	18704	144	6654	180	28650	754	10756	336	450	150	3137	83	135	34	68485	243
Aiamodakam	44950	346	5044	136	10183	268	4723	148	338	113	1884	50	10	3	67131	238
Pachotti	28416	219	6072	164	19949	525	10029	313	128	43	1566	41	34	9	66192	235
Neermaruthintholi	29580	228	5667	153	11014	290	10402	325	563	188	2052	54	32	8	59310	210
Nilappana	24126	186	4496	122	13865	365	9620	301	263	88	1419	37	115	29	53903	191
Ungu	22726	175	2442	66	16119	424	9565	299	120	40	955	25	24	6	51951	184
asokatholi	18543	143	4749	128	13510	356	10886	340	345	115	3691	97	135	34	51859	184
Cheruthekku	32158	247	2400	65	4574	120	9879	309	120	40	1352	36	0	0	50484	179
Poovathu	30241	233	2355	64	1524	40	9589	300	90	30	2110	56	0	0	45909	163
Karinochi	10670	82	4650	126	15668	412	9763	305	324	108	1580	42	324	81	42979	152
Chandanam	15950	123	2008	54	11691	308	9621	301	60	20	606	16	32	8	39968	142
Kattuthippali	11108	85	2606	70	13898	366	9681	303	83	28	2141	56	0	0	39517	140
Prasarani	9669	74	3091	84	14022	369	9784	306	165	55	2151	57	0	0	38882	138
Padakizhangu	12210	94	2376	64	11006	290	9555	299	90	30	1180	31	52	13	36468	129
Vayalchulli	12708	98	4823	130	5813	153	10171	318	240	80	2519	66	81	20	36355	129
Keezharnelli	5780	44	4252	115	10340	272	9469	296	345	115	3297	87	125	31	33607	119
Adapathiyam	10296	79	1706	46	10108	266	9747	305	38	13	1285	34	0	0	33179	118
Nayakorna	4311	33	4082	110	10770	283	9793	306	113	38	1783	47	24	6	30876	109

Name	Thrissur		Palakkad		Malappuram		Kozhikkode		Wayand		Kannur		Kasaragode		North Kerala	
	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg
Pookaitha	6262	48	1894	51	10115	266	9629	301	5	2	1624	43	0	0	29529	105
Neermathalatholi	3612	28	3760	102	11207	295	9641	301	203	68	944	25	0	0	29367	104
Ezhilampala	3676	28	1516	41	12816	337	9739	304	68	23	1141	30	10	3	28965	103
Changalamparanda	15972	123	1004	27	1568	41	9467	296	38	13	844	22	0	0	28892	102
Arayal	4119	32	3987	108	5336	140	10575	330	525	175	1881	50	0	0	26424	94
Nagadandhiveru	4429	34	1423	38	9981	263	9482	296	38	13	836	22	32	8	26220	93
Karuvapatta	8172	63	1282	35	4892	129	9704	303	75	25	1916	50	0	0	26042	92
Peral	4119	32	3419	92	5372	141	10510	328	525	175	1921	51	35	9	25901	92
Athitholu	3581	28	4079	110	5170	136	10389	325	525	175	1519	40	50	13	25312	90
Kattuvellari	10842	83	2247	61	1064	28	9647	301	38	13	1467	39	0	0	25304	90
Dharbhaveru	7417	57	1175	32	5550	146	9475	296	23	8	1216	32	0	0	24855	88
Kattupayar	3737	29	3526	95	7116	187	9571	299	105	35	751	20	0	0	24806	88
Karagil	5659	44	1614	44	6903	182	9577	299	45	15	824	22	0	0	24620	87
Kattumudira	1431	11	6986	189	5878	155	9394	294	11	4	618	16	0	0	24318	86
Ummam	5807	45	3498	95	3027	80	9688	303	150	50	2110	56	0	0	24279	86
Perinkurumbaveru	7867	61	1783	48	3815	100	9446	295	45	15	1188	31	6	2	24149	86
Kattuzhunna	4172	32	1889	51	6783	178	9734	304	60	20	1402	37	38	10	24077	85
Erukku	4823	37	2807	76	5312	140	9867	308	83	28	940	25	15	4	23845	85
Chittaratha	3230	25	3288	89	3194	84	9764	305	720	240	3224	85	0	0	23419	83
Tharthaval	6850	53	2053	55	3835	101	9387	293	75	25	778	20	50	13	23028	82
attudharbha	4530	35	2211	60	3724	98	9800	306	23	8	1871	49	0	0	22159	79
Njaval	5415	42	1732	47	4985	131	9440	295	53	18	464	12	0	0	22088	78
Kiriyath	4841	37	2016	54	4440	117	9470	296	83	28	829	22	0	0	21679	77
Thakkolam	5946	46	1467	40	3776	99	9624	301	83	28	527	14	25	6	21448	76



Name	Thrissur		Palakkad		Malappuram		Kozhikkode		Wayand		Kannur		Kasaragode		North Kerala	
	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg
Aadukottapala	3410	26	1652	45	3751	99	9419	294	3	1	1917	50	0	0	20151	71
Palvellakizhangu	3621	28	2336	63	3370	89	9603	300	48	16	719	19	0	0	19697	70
Pachila	3840	30	3318	90	1093	29	9506	297	45	15	1894	50	0	0	19696	70
Thechiveru	2868	22	1101	30	5098	134	9393	294	30	10	1096	29	0	0	19586	69
Athithippali	3505	27	1583	43	3819	100	9522	298	23	8	709	19	4	1	19164	68
Thekkadaveru	2052	16	1787	48	3943	104	9615	300	105	35	930	24	0	0	18432	65
Karkidakashringhi	3903	30	867	23	3461	91	9371	293	20	7	789	21	0	0	18410	65
Chengazhineerkizhangu	3390	26	974	26	2920	77	9335	292	45	15	808	21	15	4	17487	62
Njerinjapuli	1870	14	1320	36	4223	111	9301	291	23	8	451	12	0	0	17188	61
Cherupunnayari	1939	15	1635	44	3362	88	9446	295	53	18	417	11	0	0	16852	60
Puliyarila	376	3	903	24	5458	144	9420	294	15	5	195	5	0	0	16367	58
Thamarayalli	3629	28	945	26	1738	46	9369	293	6	2	592	16	15	4	16294	58
Kadaladi	3651	28	1080	29	1198	32	9424	294	30	10	677	18	0	0	16060	57
Thamaravalayam	3003	23	759	21	2072	55	9419	294	27	9	560	15	0	0	15839	56
Chunnamakkiyila	1806	14	1826	49	1241	33	9358	292	38	13	1125	30	0	0	15394	55
Kalliyurvanji	1762	14	1006	27	1584	42	9561	299	45	15	1402	37	0	0	15359	54
Muthil	456	4	679	18	3738	98	9176	287	75	25	853	22	0	0	14976	53
Kakkathondi	2328	18	858	23	1949	51	9356	292	30	10	422	11	0	0	14942	53
Shangupushpam	2109	16	1075	29	1718	45	9385	293	30	10	595	16	12	3	14924	53
Kazhinji	1790	14	538	15	2527	67	9377	293	23	8	479	13	0	0	14734	52
Peenari	2991	23	566	15	1326	35	9439	295	38	13	350	9	0	0	14709	52
Sheerakargoli	2436	19	682	18	660	17	9827	307	26	9	636	17	0	0	14266	51
Poovankurunthal	1083	8	397	11	2503	66	9472	296	8	3	660	17	0	0	14121	50

Name	Thrissur		Palakkad		Malappuram		Kozhikkode		Wayand		Kannur		Kasaragode		North Kerala	
	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg	Total	Avg
Karthottiveru	2482	19	894	24	819	22	9406	294	38	13	441	12	0	0	14078	50
Perumaratholi	2552	20	897	24	549	14	9403	294	23	8	653	17	0	0	14076	50
Arenukam	2486	19	875	24	520	14	9340	292	33	11	669	18	32	8	13956	49
Kargoli	1986	15	865	23	570	15	9307	291	26	9	971	26	0	0	13723	49
Somalatha	692	5	794	21	2443	64	9473	296	3	1	145	4	0	0	13550	48
Chitteenthalveru	2471	19	507	14	678	18	9464	296	8	3	353	9	0	0	13480	48
Attuvanji	1440	11	518	14	1399	37	9241	289	53	18	786	21	0	0	13436	48
Kasthurimanjal	827	6	2321	63	0	0	9402	294	0	0	722	19	0	0	13271	47
Ponnavara	2021	16	617	17	796	21	9204	288	15	5	554	15	0	0	13207	47
Chittelam	2089	16	548	15	606	16	9465	296	20	7	467	12	2	1	13197	47
Thottavadi	338	3	523	14	1677	44	9422	294	8	3	1091	29	0	0	13057	46
Ambalkizhangu	724	6	1108	30	763	20	9246	289	39	13	677	18	0	0	12557	45
Garudakodi	619	5	399	11	457	12	9296	290	8	3	1721	45	0	0	12499	44
Chonakapullu	1253	10	556	15	829	22	9396	294	18	6	361	10	0	0	12413	44
Karinkoovalam	512	4	787	21	1574	41	9250	289	15	5	261	7	5	1	12404	44
Thumbayila	411	3	2343	63	180	5	9207	288	0	0	145	4	2	1	12287	44
Channakizhangu	1294	10	723	20	448	12	9344	292	24	8	169	4	0	0	12002	43
Nanmukapullu	978	8	402	11	458	12	9365	293	18	6	331	9	0	0	11552	41
Thiruthali	484	4	678	18	236	6	9286	290	3	1	430	11	3	1	11120	39
Agori	357	3	520	14	217	6	9265	290	0	0	350	9	0	0	10708	38
Vishnukranathi	255	2	181	5	447	12	9328	292	3	1	321	8	0	0	10535	37
Karinthali	275	2	120	3	409	11	9388	293	3	1	145	4	0	0	10339	37
Ilanjipoovu	433	3	205	6	341	9	9163	286	15	5	181	5	0	0	10337	37

**Table 6. Annual Consumption of Raw Drugs by the Small Units in each District and Their Average (kg)**

<b>Local Names</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>WYD</b>	<b>KNN</b>	<b>KSD</b>	<b>TOTAL</b>	<b>AVEG</b>
Nellikka	57071	4236	5700	2310	1455	2726	322	73820	333
Kurunthotti	16174	10580	4260	7077	4050	6641	50	48831	220
Thathiri	22301	5386	2860	1925	1050	2320	640	36482	164
Chittamruthu	15034	4907	2220	1925	1125	3915	150	29275	132
Kanjunni	18098	5175	1020	2310	413	1653	100	28768	130
Amukkuram	19024	3738	3348	972	375	667	216	28339	128
Muthanga	16103	4485	2620	1650	750	1849	500	27956	126
Sathavari	12041	4332	1460	1778	1020	4843	273	25747	116
Kadukka	11172	6298	1640	1632	405	3393	185	24725	111
Adalodakam	10289	4006	2000	2145	1425	2784	1830	24478	110
Chukku	12939	5386	1820	1613	300	1559	557	24174	109
Koovalam	12298	4581	1520	1778	825	2610	365	23977	108
Brahmi	12469	2166	5560	1357	323	1392	225	23491	106
Kumizhu	10374	5386	1520	1687	675	2610	365	22617	102
Njerinjil	11728	3998	1520	1980	683	2059	453	22420	101
Orila	10046	4868	1312	1485	1005	2059	406	21182	95
Moovila	9975	4638	1320	1632	1005	2059	406	21035	95
Pathiriveru	9776	4600	1320	1668	675	2494	325	20858	94
Palakappayyani	9975	4408	1320	1338	675	2494	340	20551	93
Koduveli	11614	3028	1200	1760	1095	1682	160	20539	93
Karingali	5273	4332	2980	2493	225	4176	361	19840	89
Karinkurinji	11471	2760	860	1529	1005	1943	25	19593	88
Munja	9975	4523	1040	1448	225	1856	300	19368	87
Cheruvazhuthana	10559	2300	1300	1320	675	2639	93	18886	85
Thanikka	11329	2120	1180	1412	405	2030	185	18660	84
Thippali	11101	2319	920	1650	428	1189	244	17850	80
Kattarvazha	5843	5578	1088	1870	1275	1595	50	17298	78
Devatharam	11172	1802	1920	697	375	1189	50	17204	77
Chuvannaratha	11215	2112	964	1063	75	1566	0	16995	77
Neelayamari	8864	3182	1752	1657	300	1160	0	16915	76
Cherula	11984	2913	820	788	60	168	22	16756	75
Koduthoova	10474	1821	1040	517	405	2320	5	16582	75
Avanakku	6569	2779	1820	1063	1313	2030	231	15805	71
Veppu	10260	1476	524	1173	713	1479	132	15757	71
Kudakappala	5843	2668	3600	1283	450	1537	135	15516	70
Manjal	10146	1744	664	1540	233	950	177	15453	70
Pathimugham	9975	1917	612	733	825	638	50	14750	66
Thazhuthama	7481	2377	1128	953	488	1479	72	13978	63

TCR - Thrissur, PLK - Palakkad, MLP - Malappuram, KOK - Kozhikkode, WYD - Wayand,  
KNN - Kannur, KSD - Kasaragode, AVEG - Average

<b>Local Names</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>WYD</b>	<b>KNN</b>	<b>KSD</b>	<b>TOTAL</b>	<b>AVEG</b>
Maramanjai	8978	1591	932	972	345	731	100	13648	61
Ashokatholi	5843	2392	1700	1467	345	1711	135	13592	61
Parpidakapullu	9049	1116	880	990	195	632	32	12893	58
Kachuri	7296	1215	508	1118	180	870	0	11188	50
Naruneendi	3848	2128	2540	825	195	1189	135	10859	49
Palmuthuku	3292	1783	1880	788	810	2030	0	10583	48
Kanikkonna	5857	1284	544	1265	195	740	0	9884	45
Vayambu	5843	1384	528	645	263	893	0	9555	43
Rakthachandanam	6413	1280	580	290	180	644	92	9478	43
Aiamodakam	5301	1024	1020	862	338	754	10	9308	42
Puthirichunda	3719	2645	484	825	338	1131	81	9223	42
Vengakathal	2921	1227	1900	880	660	1195	0	8783	40
Karinochi	2978	1303	2624	546	324	580	324	8680	39
Chittaratha	2494	1840	1700	568	720	1124	0	8446	38
Kattupadavalam	3021	1407	692	1302	323	1392	20	8156	37
Neermaruthintholi	3335	1587	964	807	563	812	32	8099	36
Arayal	2907	1311	736	953	525	1241	0	7674	35
Peral	2907	1311	772	862	525	1241	35	7653	34
Vayalchulli	3634	974	632	917	240	899	81	7376	33
Uzhinja	3320	1687	420	620	60	905	15	7026	32
Avaltholi	4061	1016	760	587	113	348	0	6884	31
Athitholu	2351	1311	692	770	525	1059	50	6758	30
Pachotti	3278	1162	436	807	128	876	34	6719	30
Nilappana	2138	575	1896	458	263	609	115	6053	27
Iruveli	3064	909	564	315	278	638	55	5822	26
Keezharnelli	2494	882	840	348	345	667	125	5701	26
Ummam	3135	805	128	429	150	505	0	5152	23
Naikkorana	2380	897	564	458	113	493	24	4929	22
Cheruthekku	2066	644	328	458	120	812	0	4429	20
Prasarani	2508	418	292	488	165	551	0	4422	20
Pookaitha	2708	391	384	312	5	599	0	4398	20
Ungu	1824	1127	424	312	120	435	24	4266	19
Attudharbha	1368	556	536	367	23	1206	0	4055	18
Karuka	2636	303	444	348	15	305	0	4051	18
Thakkolam	1610	1073	292	403	83	377	25	3863	17
Kattuthippali	1710	682	412	411	83	551	0	3849	17
Padakizhangu	1682	521	452	337	90	580	52	3714	17
Kattuvellari	1140	879	440	422	38	737	0	3654	16
Erukku	1995	667	172	477	83	215	15	3623	16
Neermathalatholi	1781	557	308	297	203	464	0	3609	16
Kattuzhunnu	1226	584	344	429	60	827	38	3507	16
Adapathiyam	1810	383	252	403	38	580	0	3466	16

<b>Local Names</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>WYD</b>	<b>KNN</b>	<b>KSD</b>	<b>TOTAL</b>	<b>AVEG</b>
Chandanam	1981	472	196	348	60	341	32	3429	15
Pachila	841	1035	228	275	45	870	0	3294	15
Changalamparanda	1810	304	732	165	38	239	0	3287	15
Ezhilampala	1197	1021	272	308	68	406	10	3282	15
Thekkadaveru	1311	1073	424	246	105	0	0	3159	14
Dharbhaveru	1368	594	436	114	23	516	0	3051	14
Poovathu	983	690	344	209	90	650	0	2966	13
Kiriyath	1197	506	396	209	83	545	0	2936	13
Karuvapatta	1268	544	264	356	75	384	0	2892	13
Cherupunnayari	1140	322	1044	136	53	145	0	2839	13
Kallurvanji	1340	257	396	238	45	522	0	2798	13
Perinkurumbaveru	1055	414	332	231	45	638	6	2721	12
Ponnaveera	1924	316	232	81	15	128	0	2695	12
Akil	1055	529	344	282	45	389	0	2643	12
Chengazhineerkizhangu	1112	538	240	191	45	458	15	2599	12
Nagadhanthiveru	1197	399	256	279	38	394	32	2594	12
Tharthaval	998	575	300	231	75	348	50	2577	12
Karkidakashringhi	1097	478	188	165	20	534	0	2482	11
Chunnamukkiyila	926	281	600	191	38	399	0	2434	11
Kattumudira	1069	414	248	172	11	503	0	2416	11
Kattupayar	827	400	336	304	105	406	0	2378	11
Sheerakakoli	1197	305	300	183	26	290	0	2301	10
Njaval	955	653	292	154	53	152	0	2259	10
Athithippali	869	441	200	238	23	299	4	2074	9
Aadukottapala	713	537	172	257	3	387	0	2068	9
Karkoli	713	431	192	165	26	493	0	2019	9
Attuvanji	713	351	120	81	53	696	0	2012	9
Peenari	1097	193	308	154	38	99	0	1889	9
Thottavadi	285	345	76	209	8	943	0	1865	8
Arenukam	470	501	212	202	33	394	32	1845	8
Kadaladi	770	382	292	147	30	203	0	1823	8
Perumaratholi	770	437	224	139	23	218	0	1810	8
Njerinjampuli	798	449	240	132	23	164	0	1805	8
Thamaravalayam	926	331	128	147	27	160	0	1719	8
Karthottiveru	884	268	136	202	38	189	0	1716	8
Palvellakizhangu	713	226	96	396	48	209	0	1687	8
Thechiveru	485	290	324	220	30	336	0	1685	8
Muthil	456	368	240	128	75	363	0	1630	7
Kazhinji	955	161	212	117	23	133	0	1601	7
Thamarayalli	727	395	108	209	6	128	15	1587	7
Shangupushpam	812	173	164	95	30	273	12	1559	7

<b>Local Names</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>WYD</b>	<b>KNN</b>	<b>KSD</b>	<b>TOTAL</b>	<b>AVEG</b>
Poovankurunthal	827	104	124	191	8	300	0	1552	7
Chitteenthalveru	627	285	172	117	8	254	0	1463	7
Kakkathondi	741	196	124	110	30	247	0	1447	7
Ambalkizhangu	485	207	72	128	39	363	0	1293	6
Chonakapullu	656	212	144	121	18	107	0	1257	6
Chittelam	527	156	140	183	20	203	2	1231	6
Kasthurimanjal	827	115	0	0	0	247	0	1188	5
Nanmukapullu	556	212	148	99	18	107	0	1140	5
Channakizhangu	513	242	104	172	24	0	0	1055	5
Karinkoovalam	271	261	124	99	15	226	5	1001	5
Thiruthali	413	215	28	37	3	290	3	989	4
Somalatha	499	86	40	81	3	102	0	810	4
Garudakodi	242	69	48	73	8	290	0	730	3
Ilanjipoovu	371	115	72	44	15	97	0	713	3
Agori	314	92	128	7	0	145	0	686	3
Vishnukranthi	228	115	128	44	3	116	0	634	3
Puliyarila	242	138	72	128	15	0	0	596	3
Thumbayila	200	81	52	29	0	145	2	508	2
Karinthali	100	104	16	110	3	145	0	477	2

**Table 7. Annual Consumption of Raw Drugs by the Medium Units in each District and Their Average (kg)**

<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Kurunthotti	13027	10313	7525	7707	2700	41271	1007
Nellikka	4534	3878	5425	12544	7100	33481	817
Avanaku	3589	17793	1750	924	1400	25456	621
Thathiri	6849	5500	5950	2079	1360	21738	530
Chittamruthu	6156	2681	4550	2504	3600	19491	475
Sathavari	4995	4125	4375	2137	2300	17932	437
Kadukka	3071	4235	3990	1496	2200	14991	366
Kumizhu	4214	1788	4288	1003	3400	14692	358
Njerinjil	4306	2503	4813	957	800	13377	326
Koovalam	4275	1925	4375	1615	900	13090	319
Moovila	3269	1925	4288	1073	1500	12055	294
Orila	3161	1994	4288	1101	1500	12043	294
Amukkuram	2889	4593	2975	1325	190	11972	292
Chukku	3146	3163	4113	859	640	11920	291
Muthanga	3357	3369	3238	1087	840	11891	290
Kanjunni	2723	2640	3483	1309	1560	11715	286
Pathiriveru	3758	1746	4375	1069	700	11648	284
Adalodakam	2326	2956	3238	1981	1100	11600	283
Koduveli	4986	2888	1575	1463	630	11542	282

<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Munja	3008	1925	4375	898	1200	11406	278
Palakappayyani	3134	1925	4375	1050	900	11384	278
Cheruvazhuthana	2939	1925	3588	1792	900	11144	272
Karinkurinji	3398	1788	3675	1085	520	10466	255
Thippali	3145	2558	2056	943	880	9581	234
Vengakathal	1368	5170	1925	373	600	9436	230
Thanikka	2648	2118	1925	849	1700	9240	225
Thazhuthama	1865	2736	1925	898	1100	8524	208
Kattarvazha	2133	2406	1470	1356	900	8265	202
Karingali	2628	2503	1488	187	1340	8145	199
Devatharam	1822	2338	2223	1342	300	8023	196
Cherula	1744	1169	3413	1283	405	8014	195
Manjal	1535	3231	1225	700	230	6922	169
Brahmi	180	3025	2363	350	920	6838	167
Chuvannaratha	1247	1788	1925	1335	440	6735	164
Naruneendi	720	2127	1750	350	940	5887	144
Aiamodakam	1499	1513	1663	861	210	5745	140
Neelayamari	324	2420	1225	583	1120	5672	138
Koduthoova	1579	963	1400	842	500	5283	129
Palmuthuku	378	1815	1488	467	1100	5247	128
Parpidakapullu	2250	811	1488	352	280	5181	126
Pachotti	288	3285	1138	93	310	5114	125
Veppu	1008	1361	1050	1062	620	5101	124
Kanikkonna	1057	1925	613	945	560	5099	124
Uzhinja	342	2897	998	51	730	5018	122
Kattupadavalam	515	1650	919	782	1100	4965	121
Maramanjil	1251	1788	753	747	330	4868	119
Vayambu	1161	1265	971	728	330	4455	109
Nilappana	288	2461	1094	128	460	4431	108
Neermaruthintholi	346	1760	1050	583	620	4359	106
Kattuthippali	648	1613	1111	105	880	4358	106
Kudakappala	261	2016	1050	467	500	4293	105
Pathimugham	1620	1045	788	513	190	4156	101
Ashokatholi	450	2141	560	140	680	3971	97
Keezharnelli	486	2515	350	93	230	3675	90
Peral	162	1943	700	525	330	3660	89
Arayal	162	1943	700	502	330	3637	89
Athitholu	180	2163	578	502	210	3633	89
Avaltholi	324	1643	613	105	930	3614	88
Puthirichunda	414	963	1313	572	320	3581	87
Ummam	432	1943	499	82	530	3486	85
Rakthachandanam	621	688	1111	856	140	3416	83
Prasarani	441	1173	980	23	700	3318	81
Kattumudira	13	2072	980	117	18	3199	78

<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Kachuri	736	811	700	679	220	3146	77
Poovathu	558	913	805	233	610	3119	76
Karinochi	342	1577	744	187	250	3099	76
Vayalchulli	324	2017	306	128	300	3075	75
Karuvapatta	954	660	578	82	632	2905	71
Chittaratha	666	315	744	175	920	2820	69
Naikkorana	216	825	831	152	690	2714	66
Karuka	342	1430	429	93	370	2664	65
Kasthurimanjal	0	2200	0	117	300	2617	64
Iruveli	943	495	438	271	400	2546	62
Tharthaval	252	1430	385	105	280	2452	60
Kattupayar	180	1408	630	105	90	2413	59
Palvellakizhangu	108	1540	236	93	250	2228	54
Thumbayila	36	2008	53	82	0	2178	53
Pachila	479	733	490	93	374	2169	53
Adapathiyam	261	963	481	152	240	2096	51
Padakizhangu	378	939	429	58	270	2074	51
Erukku	378	807	490	210	130	2015	49
Athithippali	396	953	319	47	180	1895	46
Attudharbha	117	491	788	152	240	1788	44
Chunnamukkiyila	180	796	341	128	306	1751	43
Pookaitha	54	447	656	128	450	1736	42
Cherupunnayari	99	843	368	257	112	1679	41
Aadukottapala	72	440	429	93	630	1664	41
Akil	54	990	184	93	270	1591	39
Changalamparanda	162	385	499	257	255	1557	38
Neermathalatholi	396	444	324	140	240	1543	38
Chandanam	144	1027	245	63	60	1539	38
Nagadhanthiveru	117	807	350	35	192	1501	37
Cheruthekkku	342	400	271	280	200	1493	36
Shangupushpam	72	814	429	35	132	1482	36
Kattuzhunnu	216	462	289	152	360	1478	36
Kattuvellari	252	535	324	93	270	1474	36
Thelkadaveru	216	623	219	82	330	1470	36
Sheerakakoli	189	301	210	583	166	1449	35
Ezhilampala	99	345	394	257	350	1444	35
Kallurvanji	72	400	438	152	330	1391	34
Dharbhaveru	99	400	464	70	350	1382	34
Garudakodi	27	330	394	9	606	1366	33
Perinkurumbaveru	162	444	333	128	250	1317	32
Ungu	252	532	245	58	210	1297	32
Thechiveru	108	451	236	23	450	1269	31
Thakkolam	486	336	184	140	60	1205	29
Njaval	540	293	193	58	112	1196	29



<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Ponnaveera	45	301	411	82	306	1145	28
Njerinjampuli	162	532	210	70	142	1116	27
Karthottiveru	198	458	210	93	122	1082	26
Kadaladi	81	444	306	70	174	1075	26
Kiriyath	144	491	219	105	114	1073	26
Karkoli	153	356	228	70	168	974	24
Chengazhineerkizhangu	108	301	280	82	180	950	23
Thamarayalli	103	275	280	58	214	930	23
Arenukam	126	348	158	82	180	894	22
Thamaravalayam	117	330	219	23	195	884	22
Perumaratholi	99	348	175	12	195	829	20
Karkidakashringhi	216	261	123	140	75	815	20
Peenari	144	257	193	63	106	762	19
Kakkathondi	117	330	175	12	90	724	18
Ambalkizhangu	65	301	166	70	114	716	17
Chittelam	162	227	166	63	94	713	17
Puliyarila	99	413	61	93	0	666	16
Chitteenthalveru	234	128	131	131	24	648	16
Poovankurunthal	81	121	114	35	240	591	14
Thiruthali	36	413	35	19	30	532	13
Kazhinji	135	110	140	35	106	526	13
Channakizhangu	81	257	44	93	9	484	12
Somalatha	18	220	116	117	3	473	12
Chonakapullu	72	128	123	35	94	452	11
Nanmukapullu	72	128	123	23	94	440	11
Agori	36	330	44	0	0	410	10
Muthil	0	11	123	12	210	355	9
Karinkoovalam	67	73	100	58	24	322	8
Vishnukranthi	27	66	79	23	120	315	8
Attuvanji	27	55	79	70	30	261	6
Thottavadi	0	28	79	105	33	244	6
Ilanjipoovu	27	73	44	35	44	223	5
Karinthali	0	17	18	14	0	48	1

**Table 8. Annual Consumption of Raw Drugs by the Large Units in each District and Their Average (kg)**

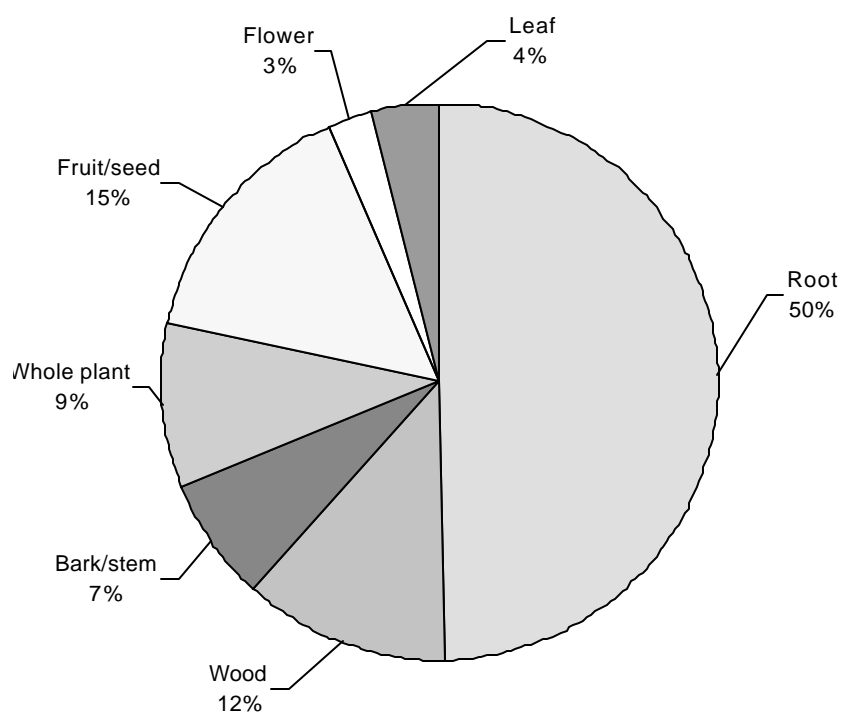
<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Kurunthotti	252000	63088	226500	60000	5250	606838	31939
Nellikka	160300	17549	217500	60000	2500	457849	24097
Chittamruthu	235200	27067	150000	15000	4000	431267	22698
Kadukka	205100	19331	97500	9000	3200	334131	17586
Chukku	187600	14530	66000	15000	1200	284330	14965
Sathavari	90650	27289	118000	6000	2500	244439	12865

<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Muthanga	139300	10410	48000	30000	1450	229160	12061
Cheruvazhuthana	68600	9932	112500	30000	1650	222682	11720
Karinkurinji	55300	24988	112500	15000	2850	210638	11086
Koovalam	70000	13897	97500	9000	2100	192497	10131
Adalodakam	95200	11871	60000	21000	2100	190171	10009
Kattarvazha	105000	6150	75000	1500	2000	189650	9982
Kanjunni	35000	25000	120000	3000	3000	186000	9789
Amukkuram	91000	9412	67500	15000	1125	184037	9686
Thathiri	81200	5227	64500	30000	2200	183127	9638
Devatharam	100800	11156	60000	9000	680	181636	9560
Njerinjil	65100	11054	67500	9000	3300	155954	8208
Veppu	105000	6018	25500	15000	1100	152618	8033
Thippali	76300	6536	47250	15000	3500	148586	7820
Thazhuthama	70000	9844	52500	1500	1300	135144	7113
Moovila	63700	7783	52500	9000	2000	134983	7104
Orila	60200	8034	52500	9000	2000	131734	6933
Koduveli	63000	6681	45000	6000	2600	123281	6488
Chuvannaratha	58800	7544	40500	15000	1200	123044	6476
Avanakku	58100	3966	33000	18000	2250	115316	6069
Kumizhu	56000	7237	46500	750	2250	112737	5934
Parpidakapullu	79100	3859	19500	3000	1950	107409	5653
Munja	35000	7671	52500	9000	2000	106171	5588
Thanikka	51100	5039	34500	9000	2600	102239	5381
Pathiriveru	35000	7208	45000	9000	2000	98208	5169
Koduthoova	54600	5358	27000	6000	1650	94608	4979
Rakthachandanam	72520	451	9750	9000	650	92371	4862
Palakappayyani	35000	7337	46500	1500	2000	92337	4860
Neelayamari	12250	6510	60075	9009	1060	88904	4679
Pathimugham	65100	1536	9000	9000	900	85536	4502
Kattupadavalam	55440	4813	19500	1500	1250	82503	4342
Manjal	37520	3844	36750	1500	900	80514	4238
Naruneendi	16450	5520	45750	9015	990	77725	4091
Brahmi	25550	4800	37500	9003	470	77323	4070
Kanikkonna	38150	240	31500	6000	1200	77090	4057
Vayambu	52150	2454	17250	3000	1010	75864	3993
Maramanjil	46200	2374	15000	9000	800	73374	3862
Uzhinja	5600	185	52650	9135	630	68200	3589
Puthirichunda	52500	1079	4500	9000	1050	68129	3586
Iruveli	53760	1008	9750	1500	760	66778	3515
Cherula	46200	8222	9000	3000	350	66772	3514
Palmuthuku	18900	2335	34500	9018	600	65353	3440
Karingali	33600	2352	18000	9144	1370	64466	3393
Avaltholi	35000	758	18375	9186	545	63864	3361
Karuka	17500	6038	30375	9270	205	63388	3336
Kachuri	35000	4232	17250	3000	1080	60562	3187

<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Pachotti	24850	1625	18375	9129	380	54359	2861
Aiamodakam	38150	2508	7500	3000	920	52078	2741
Vengakathal	11200	548	30750	9024	440	51962	2735
Kudakappala	12600	1970	24000	9006	1100	48676	2562
Neermaruthintholi	25900	2320	9000	9012	620	46852	2466
Ungu	20650	783	15450	9195	310	46388	2441
Cheruthekkku	29750	1356	3975	9141	340	44562	2345
Nilappana	21700	1460	10875	9033	350	43418	2285
Poovathu	28700	752	375	9147	850	39824	2096
Chandanam	13825	510	11250	9210	205	35000	1842
Ashokatholi	12250	216	11250	9279	1300	34295	1805
Kattuthippali	8750	311	12375	9165	710	31311	1648
Karinochi	7350	1770	12300	9030	750	31200	1642
Prasarani	6720	1500	12750	9273	900	31143	1639
Padakizhangu	10150	916	10125	9159	330	30680	1615
Adapathiyam	8225	360	9375	9192	465	27617	1454
Vayalchulli	8750	1833	4875	9126	1320	25904	1363
Ezhilampala	2380	150	12150	9174	385	24239	1276
Keezharnelli	2800	855	9150	9027	2400	24232	1275
Neermathalatholi	1435	2760	10575	9204	240	24214	1274
Changalamparanda	14000	315	338	9045	350	24048	1266
Pookaitha	3500	1056	9075	9189	575	23395	1231
Naikkorana	1715	2360	9375	9183	600	23233	1223
Nagadhanthiveru	3115	218	9375	9168	250	22126	1165
Dharbhaveru	5950	182	4650	9291	350	20423	1075
Akil	4550	95	6375	9201	165	20386	1073
Karuvapatta	5950	78	4050	9267	900	20245	1066
Kattuvellari	9450	833	300	9132	460	20175	1062
Perinkurumbaveru	6650	925	3150	9087	300	20112	1059
Kattupayar	2730	1718	6150	9162	255	20015	1053
Kattuzhunnu	2730	843	6150	9153	215	19091	1005
Kattumudira	350	4500	4650	9105	98	18703	984
Njaval	3920	785	4500	9228	200	18633	981
Erukku	2450	1333	4650	9180	595	18208	958
Tharthaval	5600	48	3150	9051	150	17999	947
Kiriyath	3500	1019	3825	9156	170	17670	930
Thechiveru	2275	360	4538	9150	310	16633	875
Aadukottapala	2625	675	3150	9069	900	16419	864
Thakkolam	3850	59	3300	9081	90	16380	862
Attudharbha	3045	1164	2400	9282	425	16316	859
Palvellakizhangu	2800	570	3038	9114	260	15782	831
Ummam	2240	750	2400	9177	1075	15642	823
Athithippali	2240	189	3300	9237	230	15196	800
Karkidakashringhi	2590	128	3150	9066	180	15114	795
Arayal	1050	733	3900	9120	310	15113	795

<b>Local Name</b>	<b>TCR</b>	<b>PLK</b>	<b>MLP</b>	<b>KOK</b>	<b>KNN</b>	<b>TOTAL</b>	<b>AVEG</b>
Puliyarila	35	352	5325	9198	195	15105	795
Athitholu	1050	605	3900	9117	250	14922	785
Peral	1050	165	3900	9123	350	14588	768
Njerinjampuli	910	340	3773	9099	145	14267	751
Pachila	2520	1550	375	9138	650	14233	749
Chengazhineerkizhangu	2170	135	2400	9063	170	13938	734
Thekkaaveru	525	90	3300	9288	600	13803	726
Thamarayalli	2800	275	1350	9102	250	13777	725
Thamaravalayam	1960	98	1725	9249	205	13237	697
Kadaladi	2800	255	600	9207	300	13162	693
Muthil	0	300	3375	9036	280	12991	684
Kakkathondi	1470	332	1650	9234	85	12771	672
Kazhinji	700	267	2175	9225	240	12607	664
Cherupunnayari	700	470	1950	9054	160	12334	649
Somalatha	175	488	2288	9276	41	12267	646
Chittaratha	70	1133	750	9021	1180	12154	640
Peenari	1750	116	825	9222	145	12058	635
Poovankurunthal	175	173	2265	9246	120	11979	630
Shangupushpam	1225	89	1125	9255	190	11884	625
Perumaratholi	1684	112	150	9252	240	11438	602
Chitteenthalveru	1610	93	375	9216	75	11369	598
Karthottiveru	1400	167	473	9111	130	11281	594
Chittelam	1400	164	300	9219	170	11253	592
Arenukam	1890	26	150	9057	95	11218	590
Chunnamukkiyila	700	750	300	9039	420	11209	590
Kallurvanji	350	350	750	9171	550	11171	588
Attuvanji	700	113	1200	9090	60	11163	588
Karinkoovalam	175	453	1350	9093	11	11082	583
Thottavadi	53	150	1523	9108	115	10948	576
Karkoli	1120	78	150	9072	310	10730	565
Chonakapullu	525	216	563	9240	160	10704	563
Ambalkizhangu	175	600	525	9048	200	10548	555
Sheerakakoli	1050	77	150	9060	180	10517	554
Channakizhangu	700	225	300	9078	160	10463	551
Garudakodi	350	0	15	9213	825	10403	548
Nanmukapullu	350	62	188	9243	130	9973	525
Karinthali	175	0	375	9264	0	9814	517
Agori	7	98	45	9258	205	9613	506
Thumbayila	175	255	75	9096	0	9601	505
Thiruthali	35	51	173	9231	110	9600	505
Vishnukranthi	0	0	240	9261	85	9586	505
Kasthurimanjal	0	6	0	9285	175	9466	498
Ilanjipoovu	35	17	225	9084	40	9401	495
Ponnaveera	53	0	153	9042	120	9368	493

**Fig. 1. Annual Consumption of Raw Drugs (plant/parts) and Their Percentage**



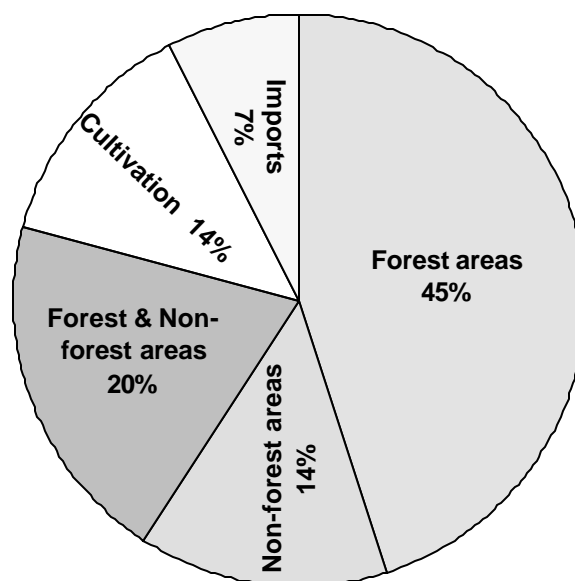
**Table 9. Annual Consumption of Raw Drugs (plant/parts) and Their Quantity**

<b>Plant/parts</b>	<b>Quantity (kg)</b>
Root	56,47,179
Wood	13,49,401
Bark/stem	8,35,884
Whole plant	10,79,390
Fruit/seed	17,17,929
Flower	2,97,507
Leaf	4,41,339
<b>Total</b>	<b>1,13,68,629</b>

The medicine manufacturing units get raw drugs collected from forests, non-forest areas and through imports. Among the 140 raw drugs 117 occur in Kerala. However, most of these plants are also occurring in the neighbouring states of Tamil Nadu and Karnataka and the raw drugs collected from these states are also sold in Kerala. Some of the suppliers of raw drugs to the large units in Kerala are located in Tamil Nadu. Among the 140 raw drugs taken up for assessing their annual consumption, 16 species are obtained from cultivated sources, 59 species from forest areas, 27 species from non-forest areas and 29 species from forests as well as non-forest areas. Nine species are obtained from outside Kerala, mostly from North India. Among the forest types, moist deciduous forests provide 40 per cent of the forest medicinal plants (Basha, 1990). Though the Tribal Service Co-operative Societies and Federation are entrusted with the collection and sale of NWFPs, their contribution in the medicinal plant trade is not significant as they prefer to collect only a few premier items which fetch higher price (Muraleedharan *et al*, 1997).

Accurate estimation of medicinal plants obtained from each source is rather difficult because of the complexity of trade in medicinal plants. Based on the distribution of medicinal plants, consumption of raw drugs collected from forests constitutes 44.94 per cent, from non-forest areas 14.31 per cent, both forests and non-forest areas 19.78 per cent, from cultivated source 13.58 per cent and from North India 7.39 per cent (Fig. 2 and Table 10).

**Fig. 2: Sources of Raw Drugs and Their Percentage**

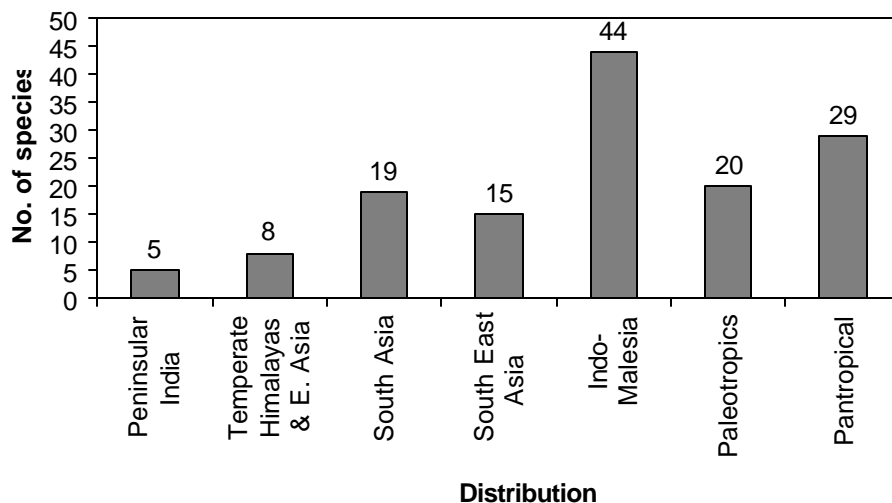


**Table 10. Sources of Raw Drugs and Their Quantity**

Source	Total (kg)	Per cent
Forest areas	51,09,195	44.94
Non-forest areas	16,27,337	14.31
Forest & Non-forest areas	22,48,328	19.78
Cultivation	15,43,789	13.58
North India (imports)	8,39,980	7.39

Analysis of geographical distribution of raw drug plants shows that as many as 29 species occur throughout the tropics and 20 species in the tropical regions of Asia, Pacific and Africa. Forty-four species in the Indo-Malesia region, a few among them extend to northern Australia. Fifteen species are distributed in the Tropical South and South-east Asian regions, 19 species in the Tropical South Asian region, 8 species in the Temperate Himalayas-East Asia region. Only 5 species are restricted to Peninsular India (Fig. 3 and Table 4). Though most of the medicinal plants are very widely distributed, their availability in South India have diminished over the years due to extraction not in proportion to their regeneration rate after harvest, reduction in their habitat, etc (Muraleedharan *et al*, 1997). Thus, they have become regionally endangered or rare. *Coscinium fenestratum* (Maramanjil), *Pterocarpus santalinus* (Raktachandanam) and *Strobilanthes ciliatus* (Karimkuringi) have been included in the list of threatened plant groups (FRLHT, 1996).

**Fig. 3: Geographical Distribution of Raw Drug Plants**



## **CONCLUSION**

Annual consumption of 140 raw drugs in the medicinal manufacturing industry in northern Kerala is about 11,350 tonnes. Consumption of raw drugs is highest in Thrissur and Malappuram districts as some of the large units are located in these districts. The sources of raw drugs are mostly from the wild (forests and non-forests), only very little quantity is obtained from cultivated source. Among the plant/parts used as raw drugs, roots and rhizomes constitute 50 per cent. Among these, roots of 6 tree species constitute 14 per cent of total consumption. Collection of roots of trees is mostly destructive and there is scarcity for the roots of tree species.

Among the raw drugs, consumption of *Parimarunnu* is 5,829 tonnes (51.4 per cent), which are locally available. Analysis of the distribution of medicinal plants reveals that only 5 species are restricted to Peninsular India, their consumption constituting 3.6 per cent. Other species have a wider distribution. However, their availability in South India has reduced over the years due to extraction. The price of imported raw drugs has increased considerably. Further, collection of 21 raw drugs from the wild has been banned by the Government of India. These drugs are important ingredients of Ayurvedic medicines. Their non-availability, restriction for collection and increased price have prompted substitutions. There are several cases in which more than one species are used for a raw drug. This is mainly due to the absence of standardization of raw drugs. As a result the dealers are selling cheaper substitutes. They often assume that they are the authority on raw drugs.

The present requirement of raw drugs, especially *Parimarunnu*, is met from Kerala and Tamil Nadu states. *Pettimarunnu* items are imported from North India and there is scarcity for these drugs. Considering the present rate of consumption and growth of the Ayurvedic medicine industry, future requirements can be mainly from cultivation. At present cultivation of most of these medicinal plants is not profitable when compared with other cash crops. However, long term planning is essential for meeting the required raw drugs for the industry through cultivation.



## **RECOMMENDATIONS**

Ayurvedic medicine manufacturing industry faces problems related to the availability as well as the use of correct parts of medicinal plants. Based on the study, the following recommendations are given.

1. Based on the availability and productivity of medicinal plants, Government of India has made restrictions on the collection of certain medicinal plants. Large scale cultivation of such plants especially in suitable areas in the High Ranges can reduce the threat on such plants. This will help to avoid the use of fake substitutes.
2. Resource enhancement of medicinal plants can be carried out with the afforestation through medicinal plants. Medicinal plant cultivation may be encouraged as an interim crop in forest plantation to increase the production.
3. The right for collection of Non-Wood Forest Products is given to the Scheduled Tribes from 1970 by the State Government. However, the contribution of the Tribal Service Co-operative Societies and the Federation in the medicinal plant trade is meager. They should exploit the market potential of the forest medicinal plants in the Ayurvedic medicine manufacturing industry.
4. Improper processing and storage cause heavy damage on the quantity as well as the quality of raw drugs. Fungal and insect damages are prevalent among these. Semi-processing like cleaning, drying, sizing and packing before storage will prevent insect and fungal damage. Storage of such semi-processed raw drugs at low humidity areas is recommended. Seasonal items are to be stored to get a higher price during off seasons.
5. Real raw drug has no gradation. But, the sale of graded quality drugs is common in raw drug trade. The knowledge on the raw drugs among the practitioners and public is diminishing. This situation is exploited by unscrupulous dealers by selling spurious raw drugs. Therefore, standardisation of raw drugs may be taken up on a priority basis.

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**Appendix I. List of Registered Ayurvedic Medicine Manufacturing Units in Northern Districts of Kerala**

**Kannur**

- |   |  |
|---|--|
| 1. Anjali Ayurvedics, Vallachal, Makkery                      | 22. Mykeel Ayurveda Vaidya Madom, Thaliparambu       |
| 2. Arogyadayini Oushadasala, Chokli, Thalasseri               | 23. NK Pharmacy, Chenakkal, Pathayakunnu             |
| 3. Arogyakasharam Pharmacy, Trikapur, Payyannur               | 24. Pappinissery Vishachikilsa Society, Pappinissery |
| 4. Aryvaidhya Bhavan, Elangod, Panoor                         | 25. PG Pharmacy, Athirakam, Mandayad                 |
| 5. Asoka Pharmaceuticals, Thalikkavu Road, Kannur             | 26. PK Oushadasala, SM Road                          |
| 6. Ayurveda Sadan, Muzhupilangad                              | 27. PM Oushadasaa, Iritty                            |
| 7. Ayurvedasram, Haji Road, Kannur                            | 28. Raghava Ayurvedic Pharmacy, Thalassery           |
| 8. Carewell Remedies, Kottai                                  | 29. Sanjeevani Vaidhya Sala, Koothuparamba           |
| 9. Damam Lab Ayurveda Medicine, Payyangadi                    | 30. Shanthi Ayurveda Vaidya Sala, Thaliparamba       |
| 10. Dhanwandari Sadanam, Thalassery                           | 31. Sidhartha Pharmaceuticals, Kotteri, Puthur       |
| 11. GI Grade Aromatics, Thottada                              | 32. Sreesadan Ayurveda Aushadasala, Kannur           |
| 12. Himalaya Pharmacy, Thalassery                             | 33. Sri. Sadsai Baba Stores, Port Road, Payyannur    |
| 13. Kamedya Products, Nellippara, Thalakkad                   | 34. Sunson Herbal Products, North Bazar, Payyanur    |
| 14. Karunakaran Vaidyar's, Arogymritha Aushadasala, Haji Road | 35. Thanuja Herbal Products, Alakode                 |
| 15. Kavya Pharmaceuticals, Thalassery                         | 36. The Kerala Ayurveda Vaidyasala, Thaliparambu     |
| 16. KKVM Pharmacy, Muzhuppilangad                             | 37. Theenmoorthy Ayurveda Bhavan, Talap, Kannur      |
| 17. Kurumathoor Aryavaidysala, Thaliparambu                   | 38. Vasudeva Pharmaceuticals (IM), Kakkat            |
| 18. Malabar Pharmacy, Iritty                                  |  |
| 19. Mamatha Pharmaceuticals, Valapattanam                     |  |
| 20. MD Aushadasala, Market Road, Kannur                       |  |
| 21. MK Ummerkoya Memorial Ayurveda Pharmacy, Parassinikadavu  |  |

**Kasaragode**

- |  |   |
|--|---|
| 1. Ezhome Ayurvedic Oushada Nirmana Vyavasaya Sahakarana Sangam Ltd., Ezhome | 3. Rosni Pharmaceuticals, Nileswar                  |
| 2. Ojus Pharmaceuticals, Kanhangad   | 4. Vimala Ayurvedic Pharmaceuticals, Parappa, Balai |

## Thrissur

1. Acharya Ayurvedic Products, Kirallur
2. Agadathantralayam, Chevur
3. Aiswarya Ayurveda Hospital & Research Centre (P.) Ltd., Karikad
4. Alpha Pharma, Pariyaram
5. Amba Pharmacy, Urakam
6. Ambic Pharmacy, Chalakkudy
7. Anala Pharmaceuticals, Porkulam
8. Aneswara Pharmaceuticals, Guruvayur
9. Arya Herbal, Kanipayoor
10. Aryan Pharmacy, Chavakkad
11. Aryavaidya Asramam, Kodangallur
12. Ashtavaidya Samskrithi, Engandiyur
13. Asoka Ayurvedic Pharmacy, West Fort
14. Ayur Remedies, Thalikkulam
15. Ayur Sidha Pharmaceuticals, Varandarapilly
16. Ayurveda Medicals, Kunnankulam
17. Ayurvedic Remedies, Puzhakkal
18. Ayush Pharma, Peringottukara
19. BB Bhavanam Pharmaceuticals, Orumayur
20. Beeta Pharma, Machingal Lane, Thrissur
21. Bioresearch Pharmaceuticals, Kunnankulam
22. Cherupushpam Pharmacy, Mala
23. Chettiparambil Ayur Products, Alathur
24. Combined Pharmaceuticals, Chalakkudy
25. Davans Pharmaceuticals, Irinjalakkuda
26. Everest Pharma, Chiyaram
27. Ganadev Oushadasala, Thaikkattussery
28. Gill Ayurvedic Products, Aranattukara
29. Greatest on Earth, Ayurphrama Division, Aranattukara
30. Immatty P Joseph's Ayurveda Oushadasala, Thrissur
31. India Ayurveda, Urakam
32. Indian Pharma, Chentrappini
33. Indian Pharmacy, Chalakkudy
34. Indian Pharmacy, Kodungallur
35. Jai Hindu Pharmacy, Kondangallur
36. James Research Lab, Nellai
37. Jeevamrutha Pharmacy, Chalakkudy
38. JJ Kalan Pharmacy, Nellai
39. Joseco Pharma, Chalakkudy
40. K's Drug Laboratories, Chalakkudy
41. Kalan Drugs and Remedies, Nellai
42. Kalan Pharmaceuticals, Nellai
43. Kalan Ayurvedic House, Nellai
44. Kalan's Divine Pharmacy, Nellai
45. Karanayil Pharmaceuticals, Karuvannur
46. Karancherry Ayurvedic Pharmacy, Cheruthuruthi
47. Kerala Ayurvedic Pharmacy, Kodakara
48. Kerala Ayurvedic Pharmacy, Patturaikal
49. Kerala Pharmacy, Ayyanthole
50. KM Manufacturers Ayurvedic Products, Kuzhikkattussery
51. KMA Oushadasala, Guruvayur
52. KMN Vaidyasala, Kodungalur
53. Kodakattil Ayurlinks, Kandanassery
54. Kodakattil Ayurveda Pharmacy, Kandanassery
55. Konkothara Ayurvedic Oushadasala, Chirakkal
56. KP Namboodiri's Ayurvedic Products, Vadakkekad
57. KPP Vaidyan Kandankulathi Vaidyasala, Kuzhur
58. Krisha Ayurvedic Pharmacy, Ollur
59. Krishna Pharma, Kaipamangalam
60. Kudumaba Vaidyan's Ayurveda Research Home, Irinjalakuda
61. Kundayil Pharmaceuticals, Nattika
62. Kunnekatt Pharmaceuticals, Guruvayur
63. Kuttans Pharmacy, Thrissur
64. Little Flower Ayurveda Oushadasala, Ollur
65. Lyman Herbal Research Lab, Peruvallur
66. M/s. Amrutha Pharmacy, Kottapuram

67. M/s. Sahya Pharmaceuticals (P.) Ltd., Valapad
68. Madhava Anglo Ayurvedic Pharmacy, Wadakkanchery
69. Mayura Laboratories, Karalam
70. Mini Ayurvedic Pharmacy, Pavaratty
71. Mother India, Pharmaceuticals, Koorkenchery
72. MR Vaidyasala, Kodungallur
73. Nambiyath Ayurvedics, Parappur
74. National Arya Pharmacy, Irinjalakkuda
75. National Ayurvedic Products, Valappad
76. National Herbal Pharma, Desamangalam
77. Navya Ayurveda Pharmacy, Velur
78. Nedumparambil Pharmacy, Irinjalakkuda
79. New Udaya Pharmacy, Chalakkudy
80. Nirmal Ayurvedic Pharmacy, Chevoor
81. OA Sivaramakrishnan Vaidyar, Parappur
82. OK Aryvaidyasala, Pavaratty
83. OK Ayurveda Vaidyasala, Pavaratty
84. Oushadi, The Pharmaceutical Co-operation, Kuttanellur
85. Palayamkot Arya Vaidayasala, Chavakkad
86. Panakkal Pharmaceuticals, Guruvayur
87. Paul Memorial Pharmacy, Ollur
88. Pockenchery Ayurvedic Nursing Home, Valapad
89. Pokenchery Ayurvedics, Valapad
90. Prabha Ayurvedic Pharmacy, Kodungallur
91. Prakash Pharmacy, Guruvayur
92. Rani Drug House, Nellai
93. Rogasamharini Vaidyasala, Chalakkudy
94. Samraja Pharmacy, Irinjalakkuda
95. Sandal Pharmaceuticals, Chalakkudy
96. Sanjeevani Ayurvedic Clinic, Vadukkara
97. Sanjeevani Pharmaceuticals, Kunnankulam
98. Sanjeevani Vaidyasala, Kuriachira
99. Sankara Pharmacy, Poonkunnam
100. Sarada Ayurvedic Pharmacy, Kodangallur
101. Sarasha Ayurveda Pharmacy, Thrithallur
102. Select Drugs & Pharmaceuticals, Chalakkudy
103. Sidha Vaidya Asramam, Thrissur
104. Sidhartha Ayurvedic Products, Valappad
105. Sincere Ayurvedic Pharmacy, Kuttur
106. Sitaram Ayurvedic Pharmacy Ltd., Veliyannur Road, Thrissur
107. Sivayogini Ayurvedic Madam, Wadakkanchery
108. SJ Pharmacy, Mullassery
109. SN Products, Irinjalakkuda
110. SNA Oushadasala, Thrissur
111. Sowparnika Herbal Extracts and Pharmaceuticals, Poothole
112. Spicela Oil Mills, Koorkenchery
113. SPS Pharmaceuticals & Lab, Kudungallur
114. Sree Narayana Pharmacy, Mala
115. Sri Krishna Products, Engandiyur
116. Sri Lakshmi Ayur Medical Corporation, Punnayurkulam
117. Sriram Herbal Remedies, Anandapuram
118. Stan Pharmaceuticals, Chalakkudy
119. Star Style Perfumery Works, Vadookkara
120. Super Drugs of Kerala, Kodungallur
121. SV Products, Irinjalakkuda
122. The Trinity Pharmaceuticals, Aranattukara
123. Tripti Pharmaceuticals, Kadavallur
124. Vaidya Ratnam Oushadasala, Chuvannamannu
125. Vaidyaratnam Oushadhasala, Thaikattussery
126. Vasishta Ayurveda Pharmacy, Pazhaya Nadakkavu, Thrissur
127. Vasudeva Medical Store, Anthikkad
128. Velakkattu Ayurvedic Products, Arimpur
129. Vijaya Pharmacy, Kokkala, Thrissur
130. Well Known Pharmaceuticals, Koolimuttam

### **Kozhikkode**

1. Appson's Ayurvedics, Chaliyam
2. Arannya Ayurveda Vaidyasala, Koyilandi
3. Arun Pharmaceuticals, Thiruthiyad
4. Arya Vaidya Vilasini Vaidya Sala, Calicut
5. Deseeya Ayurvedic Pharmaceuticals, Pannur
6. Deseeya Oushadasala, Vadakara
7. Dhanwanthiri Pharmacy, Kandankulangara
8. Fugiyama Ayurvedic Research Centre, Nanmanda
9. Himalaya Ayurveda Pharmacy, Nathapuram
10. Kadathanad Ayurveda Pharmaceuticals, Vadakara
11. Kairali Vaidysala, Karanathur
12. Kalidasa Pharmaceuticals, Perumanna
13. Kamaniya Unani Vaidyasala, Chalapuram
14. Karthika Pharmaceutical and Researchers, Elathur
15. Kerala Ayurvedic Co-operative Society, Meenchantha, Kozhikkode
16. KVS Medicals, Koyilandi
17. Lakshmi Pharma, Koyilandi
18. Malabar Sakthi Oushadasala, Azhichavattam
19. Manoj Ayurvedic Pharmaceuticals, Vadakara
20. Mini Ayurveda Vaidyasala, Vattoli
21. Nanminada Ayurveda Oushadasala, Nanminada
22. Narayana Ayurvedic Pharmacy, Karanthur
23. Naveen Ayurvedic Pharmacy, Iyyad
24. Puthiyara, Mattummel Hospital, Puthiyara
25. PVS Vaidyasala, Kakkodi
26. Ratna Aryavaidya Pharmacy, Athanikkal
27. SA Pharmacy, Kallai
28. Sadanand's Ayurvedic Pharmacy, Mankavu
29. Shfi Dawa Khana Health Centre, Chelavur
30. Sivanantha Ayurvedic Pharmacy, Perambra
31. Vattampoyil Ayurvedics, Kallai
32. Vellyeri Vaidyasala, Narikunni

### **Wayanad**

1. Cheriyeikkan Smaraka Marma Chikilsalayam, Mananthavady
2. Kozhikkode Ayurveda Pharmacy and Stores, Sultan Bathery
3. Sankar Ayurvedic Pharmacy, Pulpalli

### **Palakkad**

1. Active Pharma, Ambikapuram
2. Arya Ayurvedic Products, Palakkad
3. Arya Vaidyodayam Vaidyasala, Ottappalam
4. Aryavaidya Pharmacy, Kanjikkode
5. Aryavaidya Pharmacy Coimbatore Ltd., Thennilapuram
6. CNS Chikilsalayam, Thrithala
7. Ezhuthanchan's Agrogodyayam Vaidyasala, Ambikapuram
8. Heal Ayurveda Pharmacy, Kanjikkode
9. Illaban Remedies, Puthur
10. KA Samacham Hospital and Nursing Home, Shornur
11. Kakkanat Ayurveda Asramam, Shornur
12. Kamana Pharmas, Kallekulangara
13. Kevees Pharmaceuticals, Thrithala
14. Krishna Clinic, Paruthipulli
15. Lukaman Ayurvedic Pharmaceuticals, Cherpalassery

- |   |  |
|---|--|
| 16. Madanmithra Oushdasala, Pirayiri                              | 26. Rasathantra Pharmaceuticals, Parli                         |
| 17. Madhava Pharmacy, Shornur                                     | 27. Rekha Pharmaceuticals, Puthukkode                          |
| 18. Malabar Sidhavaidya Asramam,<br>Ottappalam                    | 28. Rohini Ayurvedic Pharmaceuticals,<br>Vaniampara            |
| 19. Mini Pharma, Pattambi   | 29. Sakthi Pharmaceuticals, Thrithala                          |
| 20. Narayana Ayurveda Chikilsalayam,<br>Chittilenchery            | 30. Siphas Pharma, Palakkad                                    |
| 21. Narayanan Vaidyar's Ayurveda<br>Chikilsalayam, Chittilenchery | 31. Sri Lakshmi Pharmaceuticals, Palakkad                      |
| 22. Padma Pharmacy, Shornur                                       | 32. Suddhi Products, Karalmanna, Palakkad                      |
| 23. Pathinettamkandam & Munhakanni<br>Pharma, Parassery           | 33. Suresh Products, Ottapalam                                 |
| 24. Pathinettamkandathil AVA Vaidyasala,<br>Olavakkode            | 34. Thoppil Ayurvedics, Chalissery                             |
| 25. Quality Drugs and Pharmaceuticals,<br>Pirayiri                | 35. Vaidiakkaram Medicine Manufacturing<br>Company, Olavakkode |
|   | 36. Vaidyamadam Vaidysala and Nursing<br>Home, Thrithala       |
|   | 37. Vijaya Ayurvedic Pharmacy, Pattambi                        |

#### **Malappuram**

- |   |   |
|---|---|
| 1. Acheerithodi Vaidysala, Aliparamba                                   | 16. Lavanya Herbals, Manjeri                              |
| 2. Amjatha Pharma, Irumbilyam   | 17. Majeri Aryurvedic Pharmacy, Manjeri                   |
| 3. Anand Ayurvedic, Thirurangadi  | 18. Mangalodayam Vaidyasala,<br>Sankaramkulam             |
| 4. Changampaily Ayurvedic Vaidysala,<br>Valanchery                      | 19. Mohan Pharmacy, Malappuram                            |
| 5. Changampalli Vaidya Bhavan & Marma<br>Chikilsa Kendram, Thirunnavaya | 20. MVS Ayurvedic Research Centre,<br>Kondotti            |
| 6. Chankaramkulam Aryavaidysala,<br>Chenkaramkulam                      | 21. Peringattuthodiyil Herbals, Irumbilyam                |
| 7. Chethana Medicaments, Perinthelmann                                  | 22. Pilathottil Ayurvedic Pharmaceuticals,<br>Othukkungal |
| 8. Edappal Ayurveda Vaidyasala, Edappal                                 | 23. Prasad Ayurvedic Products,<br>Karivarakundu           |
| 9. Gopal Ayurvedic Sadan, Perinthelmann                                 | 24. Sai Kripa Pharmaceuticals, Karippole                  |
| 10. Govinda Pharmacy, Pulamanthole                                      | 25. Salafi Meidical Centre, Pulickal                      |
| 11. Herbo India Ayurvedic Co-operative<br>Society, Vengara              | 26. Sankar Ayurvedic, Tirur                               |
| 12. Jyothi Ayurvedic Pharmaceuticals,<br>Edavanapara                    | 27. Santhosh Pharmaceuticals,<br>Kadalundinagaram         |
| 13. Kalpaka Pharmacy, Irumbilyam  | 28. Santhosh Pharmacy, Kadalundinagaram                   |
| 14. Kerala Ayurveda Vaidyasala,<br>Chenkerankulam                       | 29. SK Pharmacy, Kuttipuram                               |
| 15. Lakshmi Vilas Aryavaidysala,<br>Perunthelmann                       | 30. SRD Ayurvedics, Pulamanthole                          |
|   | 31. Sri Ganesh Ayurvedic Pharmacy,<br>Areacode            |

32. Sushrutha Ayurvedic Pharmacy and Nursing Home, Tirur
33. Susrutha Ayurveda Pharmacy, Perumanna
34. Vaidya Ratnam PS Varier's Aryvaidyasala, Kottakkal
35. Vidhya Ratna Prabha Vaidysala, Valanchery
36. Vimala Smaraka Pharmacy, Perinthalmanna
37. Viswakeerthy Ayurvedic Pharmacy, Kalpakanchery
38. Warriar Herbal Products, Wattakula



## Appendix II. Sample Questionnaire

### KERALA FOREST RESEARCH INSTITUTE, PEECHI

SURVEY ON COMMERCIAL EXPLOITATION OF MEDICINAL PLANTS IN NORTHERN KERALA

Name of the firm :

Address :

Year of establishment :

Year of registration :

Total turnover :

Total number of products produced :

Production capacity :

#### Source of Medicinal Plants

Name of Raw Drugs	Total Quantity		Price/ kg	Sources				
	97-98	98-99		Societies/ Federation	Private traders			Imports
					Agents	Collectors	Dealers	Agents
Kurunthotti								
Nellikka								
Chittamruthu								
Kadukka								
Chukku								
Sathavari								
Muthanga								
Cheruvazhuthana								
Thathiri								
Karinkurinji								
Koovalam								
Kanjunni								
Adalodakam								
Amukkuram								

Kattarvazha								
Devatharam								
Njerinjil								
Thippali								
Veppu								
Moovila								
Orila								
Thazhuthama								
Avanakku								
Koduveli								
Kumizhu								
Chuvannaratha								
Munja								
Pathiriveru								
Thanikka								
Parpidakapullu								
Palakappayyani								
Koduthoova								
Neelayamari								
Brahmi								
Rakthachandanam								
Pathimugham								
Manjal								
Kattupadavalam								
Naruneendi								
Karingali								
Kanikkonna								
Maramanjal								
Cherula								
Vayambu								
Palmuthuku								
Puthirichunda								
Uzhinja								
Iruveli								
Kachuri								
Avaltholi								
Vengakathal								
Karuka								
Kudakappala								
Aiamodakam								

Pachotti								
Neermaruthintholi								
Nilappana								
Ungu								
Ashokatholi								
Cheruthekku								
Poovathu								
Karinochi								
Chandanam								
Kattuthippali								
Prasarani								
Padakizhangu								
Vayalchulli								
Keezharnelli								
Adapathiyam								
Naikkorana								
Pookaitha								
Neermathalatholi								
Ezhilampala								
Changalamparanda								
Arayal								
Nagadhanthiveru								
Karuvapatta								
Peral								
Athitholu								
Kattuvellari								
Dharbaveru								
Kattupayar								
Akil								
Kattumudira								
Ummam								
Perinkurumbaveru								
Kattuzhunnu								
Erukku								
Chittaratha								
Tharthaval								
Attudharbha								
Njaval								
Kiriyath								
Thakkolam								

Aadukottapala								
Palvellakizhangu								
Pachila								
Thechiveru								
Athithippali								
Thelkadaveru								
Karkidakashringhi								
Chengazhineer - kizhangu								
Njerinjampuli								
Cherupunnayari								
Puliyarila								
Thamarayalli								
Kadaladi								
Thamaravalayam								
Chunnamukkiyila								
Kallurvanji								
Muthil								
Kakkathondi								
Shangupushpam								
Kazhinji								
Peenari								
Sheerakakoli								
Poovankurunthal								
Karthottiveru								
Perumaratholi								
Arenukam								
Karkoli								
Somalatha								
Chitteenthalveru								
Attuvanji								
Kasthurimanjal								
Ponnaveera								
Chittelam								
Thottavadi								
Ambalkizhangu								
Garudakodi								
Chonakapullu								
Karinkoovalam								
Thumbayila								

Channakizhangu								
Nanmukapullu								
Thiruthali								
Agori								
Vishnukranthi								
Karinthali								
Ilanjipoovu								

### **Supply of Medicinal Plants**

1. Whether manufacturers are getting continuous supply of medicinal plants?
2. Seasonality of medicinal plants
3. Medicinal Plants which are in short supply

### Appendix III. List of Medicinal Plants Recommended for Cultivation

Local Name	Botanical Name
Adapathiyan	<i>Holostemma ada-kodien</i> Schult. ( <i>Holostemma annulare</i> (Roxb.) K. Schum.)
Amukkuram	<i>Withania somnifera</i> (L.) Dunal
Asokam	<i>Saraca asoca</i> (Roxb.) de Wilde ( <i>Saraca indica</i> auct. non L.)
Athi	<i>Ficus racemosa</i> L. ( <i>Ficus glomerata</i> Roxb.)
Attukottappala	<i>Aristolochia bracteolata</i> Lam.
Cheruvazhuthina	<i>Solanum anguivi</i> Lam.
Jeevakam	<i>Malaxis rheedei</i> Sw.
Karingali	<i>Acacia catechu</i> (L.f.) Willd.
Kattupadavalam	<i>Trichosanthes cucumerina</i> L.
Kattuvellari	<i>Citrullus colocynthis</i> (L.) Schrader
Kiriyath	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees
Koovalam	<i>Aegle marmelos</i> (L.) Correa
Maramanjil	<i>Cosciniun fenestratum</i> (Gaertn.) Colebr.
Munja	<i>Premna serratifolia</i> L.
Neelayamari	<i>Indigofera tinctoria</i> L.
Nirmaruthu	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.
Palakappayyani	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz
Pathimugham	<i>Caesalpinia sappan</i> L.
Pathiri	<i>Stereospermum colais</i> (Buch.-Ham.ex Dillw.) Mabber. ( <i>Stereospermum tetragonum</i> DC.)
Ponkorandi	<i>Salacia oblonga</i> Wall. ex Wight & Arn.
Raktachandanam	<i>Pterocarpus santalinus</i> L. f.
Thathiri	<i>Woodfordia fruticosa</i> Kurz.
Ungu	<i>Pongamia pinnata</i> (L.) Pierre
Vizhal	<i>Embelia ribes</i> Burm. f.
Kanikkonna	<i>Cassia fistula</i> L.
Chenmaram	<i>Aphanamixis polystachya</i> (Wall.) Parker ( <i>Amoora rohituka</i> (Roxb.) Wight & Arn.)
Plash	<i>Butea monosperma</i> (Lam.) Taub.
Sathavari	<i>Asparagus racemosus</i> Willd.
Cherupunnayari	<i>Celastrus paniculatus</i> Willd.
Neermathalam	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.
Koduveli	<i>Plumbago indica</i> L.
Somalatha	<i>Sarcostemma acidum</i> (Roxb.) Voigt
Karthotti	<i>Hugonia mystax</i> L.



Weekly raw drugs market at Vadakara



"Roots" of *Munja*



"Roots" of *Pathuri*





Roots of *Kurunthotti*



Roots of *Orila*



Raw drugs stored in open