

A REPORT ON

**AGRI. EXPORT ZONE:  
PROSPECTS OF WAYANAD DISTRICT**

Prepared by

**Wayanad Agriculture Development Committee**

C/o. Community Agrobiodiversity Centre

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July 7, 2003



## **WAYANAD AGRICULTURAL DEVELOPMENT COMMITTEE**

### **About us**

Wayanad Agricultural Development Committee (WADC) is a working group formed in October 2001 at Kalpetta with a purpose of bringing together various issues and problems of sustainable agricultural development of Wayanad district. The **WADC** is largely a group of farmers, representatives of Agricultural Research Stations like, RARS Ambalavayal, Regional Coffee Research Station, Chundale, State Agriculture Department, Spices Board, M.S. Swaminathan Research Foundation, Organisations like OFCO, RASTA, representatives of various Political Parties, representatives of Nationalized Banks like NABARD, SBT, CANARA Banks and representatives from marketing sector. This committee is also meant to be functioned as a “Lobby” for agriculture development of the district among the community, local, regional and national levels. At present WADC is attached to the Community Agrobiodiversity Centre (CABC) of M S Swaminathan Research Foundation, located at Kalpetta, Wayanad District

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A Report on Agri. Export Zone: Prospects of Wayanad District

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June 25, 2003

Type Setting : *K.N. Shyja & Sreevidhya*  
Layout & Photo cover : *Sreevidhya & G. Girigan*  
Photo Credit : CAbC

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## Acknowledgement

The Wayanad Agriculture Development Committee gratefully acknowledges the following individuals and institutions that have contributed to the preparation of this Report.

Prof. M. K. Prasad, Kerala Sasthra Sahithya Parishath (KSSP); Dr. N. Sasidharan, Kerala Forest Research Institute (KFRI), Thrissur; Sri. A. Ratnam, Chairman, Management Advisory Committee, CABc and Dr. K.V. Peter, Vice Chancellor, Kerala Agriculture University and the Programme Advisory Committee member of CABc.

M. S. Swaminathan Research Foundation would like to thank the Swiss Agency for Development and Co-operation (SDC), New-Delhi for their financial support to take up this feasibility study under the project, "Biodiversity Conservation, Integrated Nature Resources Management and Poverty Reduction".

We are grateful to State Bank of Travancore and Canara Bank, Kalpetta which was gracious enough to enable us to bring out the report in a printed form for wider dissemination.

**AGRI EXPORT ZONE – AN INTRODUCTION**  
**R. Venu Gopal, Secretary, Agricultural Whole Sale Market, Wayanad**

## Chapter I

### AGRI EXPORT ZONE – AN INTRODUCTION

The Agricultural sector is facing stiff challenges in the new millennium. The globalization of economy, the impact of WTO obligations and the Agreement on Agriculture (A o A) signed by the member countries have resulted in negative growth and low profitability. The agricultural scene in Kerala State was so far dominated by a thrust on production only and market linked production was never been the focus. There were not enough investments for providing much needed facilities for processing, grading, packing, activities for value addition and quality improvement. The thrust of Agriculture in the changed scenario should be to exploit the opened up international market, which may help us to gain better market access, for which the farmers have to be equipped to face the emerging global challenges. Establishment of Special Agricultural Export Zone is one such activity to meet the above objective.

Agricultural Export Zones are specific and contiguous geographic areas that have their own competitive advantage in production, processing and marketing of a specific agricultural produce, which also have considerable international demand. Unlike other Special Economic Zones (SEZ) and 100% EOUs, the concept of AEZs is more flexible, location specific and there is no physical demarcated boundaries and 100% compulsory export obligation. The aim of AEZ is to take a comprehensive look at a particular produce or product located in a contiguous area for the purpose of developing and sourcing the raw materials, their processing and packaging, leading to final exports. Thus the entire effort is centered on a cluster approach, integrating the entire process right from production to market and also Identifying / enlisting procedural and quality standard related issues encountered at each stage and suggest suitable packages and solutions to solve these issues.

The principles of Agri Export zones are based on a concerted approach emphasizing on *Partnership, Convergence and Focus*.

**Convergence** – The state and central governments have been implementing various production-oriented schemes and market intervention programmes in a wider area and also in a scattered pattern. The activity of Agri export zone is to identify these existing interventions and the ongoing schemes of Central & State Governments including Commodity Boards, and converge these within the AEZs for utilising in a coordinated manner to promote ultimate export.

**Partnership** – Unlike the typical Governmental scheme implementation the AEZ scheme envisages a closer interrelationship between Central Government, State Government, Farmer, Processor and Exporter. The overall objective is to have consistent supply of quality produce by the farmer to the processor and finally to the exporter, which can effectively compete in international market. Each stakeholders or players are well-defined and mutual trust, interest, willingness of each player to find solutions and models are also very critical. Commitments from Commodity Boards, Central & State Governments and their capacity to facilitate and deliver is as important as the commitment from the farmers and processors to honour the agreement / understanding

and to maintain the required quality standards for establishing a credible and sustainable supply chain.

**Focus** – The AEZs provides a completely focused approach to facilitate the entire activity of production to marketing eliminating various regulative and unnecessary controls with a primary objective of export. This includes removal, amendment and enactment of rules and regulation concerning duties tariffs relating to international trade and goods movement.

## **Interventions in Agri Export Zones**

*Financial Interventions* – Various assistance schemes available for farmers through Commodity Boards, Central & State Organisations – APEDA, NHDB, Ministry of Agriculture, Department of Food Processing Industries, NCDC, and several others are channelised to the designated Agri export Zones in a coordinated manner.

*Fiscal Interventions* – Central & State Governments will be intervening with the primary objective of enabling duty free access to inputs for the purpose of exports. Advance licenses are provided for sourcing duty free inputs. Facility for concessional duty under the export Promotion Capital Goods Scheme will be provided for import of Capital goods not only to direct exporters but also to service providers. Exporters of value added agri products will be eligible for sourcing duty free fuel for generation of power provided the cost component of power is 10% or more. Similarly input output norms can also be fixed for sourcing other inputs like fertilizer, pesticides etc duty free for cultivation purposes.

*Monetary Interventions* – The farmers can avail themselves of concessional credit facility as per the circular issued by the RBI. NABARD, directly and through banking institutions will be playing a crucial role by providing credit for the entire activity of production, processing and also to develop necessary infrastructure. Promotion of credit supported Contract Farming is also a welcome policy initiative.

*Administrative intervention* – A nodal agency will be identified and designated for coordinating the activities of AEZs. The state governments will also have to identify the agency for undertaking research and extension activities for AEZ.

*Legislative intervention* – The respective state governments will issue necessary guidelines, enact suitable amendments in the existing laws to facilitate smooth and hassle free implementation of the project.

## **SETTING UP AN AEZ**

- Conduct market analysis to assess the export & internal market potential for a particular produce
- Ascertain / Develop quality parameters to make the product / produce acceptable in the international market.



- Identify the intervention required and agency to take up, at each stage of the value chain to come up with such a produce / product
- Arrange for quality inputs like seeds / planting material, fertilizer, Pesticides etc to support the production activity.
- Timely and concessional credit facilitation for infrastructure development, processing activity and also to farmers for adopting advanced production technology.
- Pre Harvest protocol – Develop appropriate pre harvest protocol and by effective extension methods ensure the adoption of these protocols and practices. (GAP, ORGANIC etc.)
- Post harvest management.
- Establishing Infrastructure for processing and value addition, of international standards & certification.
- Developing packaging system and infrastructure
- Market development - Brand building, Creating identity for Products having geographical indicative characters and ethnic varieties.
- Creating transparent, accountable marketing system & infrastructure including warehousing
- Developing e-commerce and web portals to compliment the traditional marketing system.
- Market information system – Identifying the source of information, system for processing the raw information and effective dissemination.

## **MARKETING**

Marketing is the key to the success of AEZ. Identifying the produce / product, positioning suitable packing and appropriate pricing will ultimately determine the success of every AEZ.

(Based on the presentation made by the Chairman, APEDA)



**Wayanad- A Rich Agrobiodiversity Centre**  
*N. Anil Kumar & G. Girigan*

## Chapter II

### Wayanad- A rich Agrobiodiversity Centre of Kerala

Wayanad, one of the 14 districts of Kerala with an area of 2136 sq. km. and a human population of 7,80,167 (Census Report 2001), is perhaps the single richest Agrobiodiversity Centres of the state with a long history of agricultural and traditional health care systems. This district is considered to be one of the earliest human settlement areas in Kerala as evidenced by the historical monuments and other pre-historic documents. Wayanad has the highest concentration of tribals in Kerala, which form 17.1% of the total population of the district. The district is a natural abode of Spices, Beverages, Fruits & Vegetables and Medicinal & Aromatic Plants. Wayanad district stands remarkably high in terms of the production of fruits, vegetables, spices, beverages and medicinal & aromatic plants in the State. Considering its richness in varietal diversity of these crops and quantity and quality of its production as well as the knowledge wealth associated with the crop systems, this district could be safely qualified for any venture in agricultural product marketing.

#### *I. Wayanad- An Agrobiodiversity Hot Spot*

The Western Ghats is more popularly known by the name the Malabar Region (Hooker 1904), which is considered as one of the biodiversity hot spots in the World that abounds a multitude of plants and animals in diverse kinds of vegetations. Wayanad lies on a plateau in this Ghat that gradually slopes from 10, 000 meters of Nilgiri to a midlevel plateau, the Gudalur- Cherambady tract, which continuous into the extensive Wayanad part of 700 –750 m elevation, broken by undulating hills. The main types of vegetation

are wet evergreen forests, moist deciduous forests, sholas and grasslands. The Western Ghats with a chain of majestic hillocks at its southern-eastern side is formed into an extensive spur-hill known as the Nilgiris (Nair 1991).

The district can be clearly divided into two ecological- zones- the south wet- evergreen forest zone and northern dry deciduous forest zone, which largely occupied now with eucalyptus and teak plantations. This region is rich in biodiversity with a high percentage of endemism; for instance about 300 species out of an estimated 2000 species of flowering plants endemic to Western Ghats are found in this district. Some of the exclusively endemic species of flowering plants of the district are *Tephrosia wayanadensis*, *Hedyotis wayanadensis*, *Cynomytra bourdillonii* and *Bulbophyllum rheedei*. Many species in this district are included in the Red Data Books of the Botanical Survey of India and a large number of once commonly available species and varieties to communities have now become very rare or not conveniently existing. Recent studies by MSSRF show this area is in existence with about 650 medicinal plants, 343 wild food species, 150 vegetable varieties and about 14 traditional rice varieties. The landscape diversity varies from forests, bushes, thickets, rocky grass lands, fallow fields, springs, streams, canals and wetlands- a fine example of a heterogeneous ecosystem in which a number of highly useful medicinal plants are reported.

The ethnic diversity is also equally impressive in the district, as evidenced by the presence of 5 dominant tribal groups, *Kurichiya*, *Kuruma*, *Paniya*, *Adiya* and *Kattunaikka* and other 7 minor communities namely, *Koombaranmar*, *Kadar*, *Pulayar*, *Mannan*, *Kuravar*, *Malayan* and *Thachanadan Moopan*.

## II. Present land use pattern

Wayanad accounts for 5.5% of the total area, 7.3% of the total forest area and 5.3% of the net sown area in the state. Total land area of the district is 212560 ha out of which 37.1% under forest cover and 54.6% area under agriculture purpose.

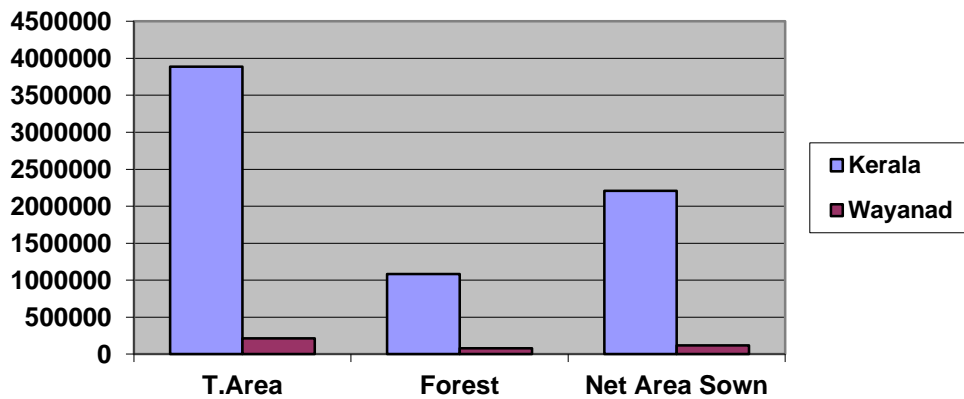
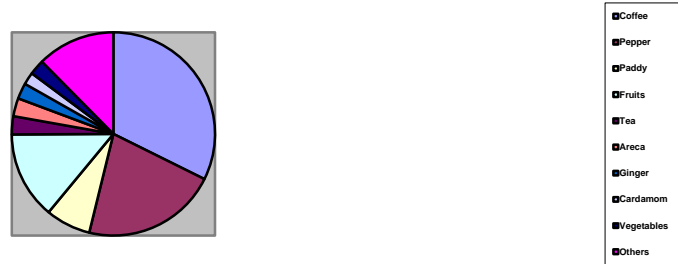


Fig.1. Land use pattern of Kerala and Wayanad shown in hectares

## III. History of cultivation

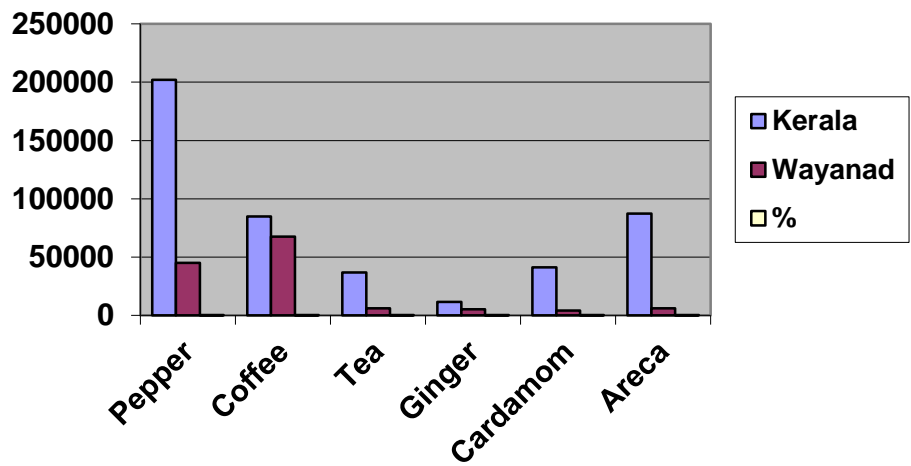
Wayanad has a long history in agriculture. Shifting cultivation was in practice by the tribal communities like the *Kurichiyas* and the Kurumas with *Muthari*, *Chama* and *Thina* were the main crops. Settled agriculture started with the paddy cultivation. A study conducted by M.S. Swaminathan Research Foundation shows more than 75 traditional varieties were cultivated in various parts of Wayanad District during 1970s. Among the traditional rice varieties, a good number of rice cultivars like *Gandhakasala*, *Jeerakasala*, *Veliyan*, *Kayama* etc are believed to be evolved in this place. More than 80% of the people in Wayanad depend on agriculture either directly or indirectly for their livelihood. Coffee, pepper, tea, banana, paddy, cardamom, ginger, vegetables etc are the main crops presently cultivated in Wayanad.

Fig.2. Area under different crops, Wayanad



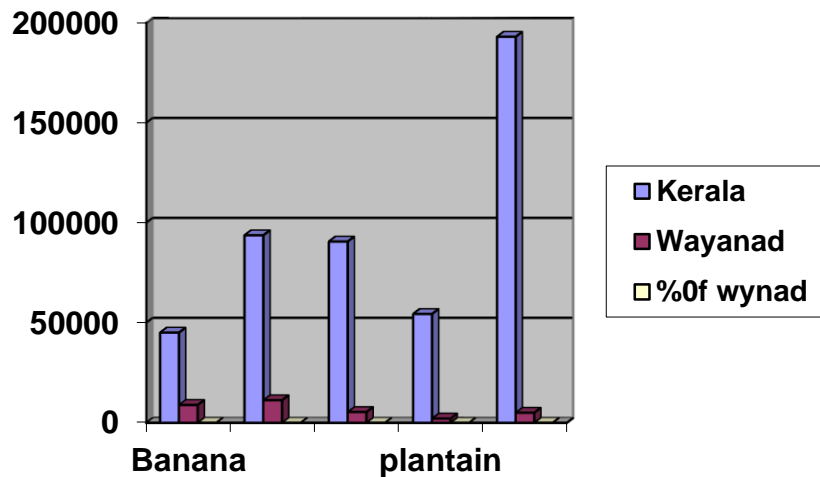
Wayanad has got its own place in the agriculture map of Kerala. More than 70% of the total agriculture land is occupied by cash crops. Coffee, Pepper, Tea, Cardamom etc are the important cash crops cultivated in Wayanad. Vanilla is getting popularized very fast in Wayanad. Wayanad District possess primary position in the area under production of Banana (8935 ha), ginger (5244 ha) and coffee (67560 ha).

Fig.3. Area under major cash crops in Kerala and Wayaand (Area in ha.)



The district possesses second position in the area under pepper (44908 ha), cardamom (4108 ha), jack (11320 ha), tea (6035 ha), lemon grass (229ha) and fodder grass (196 ha). Wayanad is also important producer of mango (5409 ha), other plantain (2152 ha), arecanut (6033ha), tubers (1727 ha) and other fresh fruits (817 ha). The following figure shows the area under fruit crops in Wayanad and Kerala.

Fig.4. Area under fruits and vegetables from Kerala and Wayanad



Studies conducted by MSSRF reveal that the diversity and availability of medicinal plants are very high in Wayanad. Wild collection of medicinal plants and other minor forest produces are now largely traded in the local market. Topographical peculiarities and favourable climate enhance the potential of mass cultivation of medicinal and aromatic plants in Wayanad.

A notable feature of Wayanad District is the Coffee based farming system where other cash crops like pepper, ginger, cardamom, and vanilla are integrated. *Wayanadan Pepper* is most important, because its property, size and dry weight are strikingly different from that of produced in other areas of the state. The humid tropical forest environment and the optimum altitude of 700-900 m of the district that is ideal for luxuriant growth of this species has contributed to this geographical significance of the cultivated pepper. Cultivated *Piper nigrum* and species like *P. galeatum*, *P. sugandhi* and *P. Wightii* co-exist in many localities in Wayanad, which also may have contributed to the special properties of Pepper in Wayanad.

*Wayanadan Ginger* and *Wayanadan Nendran* (Banana variety) earned high appreciation and admiration in the market in India and in Gulf Countries. Wayanad produces largest quantities of these two crops in the State. Species diversity and varietal diversity of these two are very high in the district as evidenced by the presence of its many Farmer Varieties like *Wayanad local*, *Mananthody* and *Maran* in case of Ginger in this region. Four species of wild ginger are seen in the district, apart from many varieties of the cultivated species, *Zingiber officianale*.

This region is also rich in biodiversity with a high percentage of endemism, for instance about 300 species out of an estimated 2000 species of flowering plants endemic to Western Ghats are found in this district. The landscape diversity varies from forests, bushes, thickets, rocky grass lands, fallow fields, springs, streams, canals and wetlands- a fine example of a heterogeneous ecosystem in which a number of highly useful medicinal

plants are reported. The advantageous features of Wayanad district in terms of its potential for agricultural development are:

- Highly fertile land with abundant rain and sunshine
- Over 30% of forested area that provide abundant biomass
- Diverse kind of peoples' institution like NGOs, SHGs, Farmers' Forums, Political forums, etc. and their networks
- Strategic geographic position (Well connected by road traffic between cities like Bangalore, Mysore, Calicut, Kannur and Nilgiris.)
- Rich traditional knowledge on health care systems
- Possession of over 650 medicinal plants
- Tradition of cultivation of medicinal and scented rices
- Large supplying history of NTFP
- Having institutions like M. S. Swaminathan Research Foundation and RARS
- The high Availability of skilled labour force.
- Other infrastructural facilities provided by KINFRA, District Rural Agricultural whole- sale Market etc.
- High per capita availability of cultivable land
- The inputs essential for practicing organic farming viz Bio-mass, Bio-mannure, Botanical pesticides, Traditional knowledge etc easily available
- Wide variety of exportable **agro bio-diversity** eg: Forest produces, Honey
- Financing institutions like NABARD, Lead Bank, Co-operative Banks and Local Bodies (Planning Fund) are active here.

An analysis of CEBECO Report (2002) clearly reveals that Banana is one of the produces projected for export from Kerala. Wayanad is top most both in area of cultivation and production of Banana among districts. In Banana, Wayanad has a productivity of 7.6 whereas Kerala average is 7.28. Productivity can be tripled even in the existing area with the application of available technology. So while considering a venue for promoting export of Banana Wayanad is the most ideal location. In the case of banana (*Nenthran*) and other plantain varieties Wayanad can play a significant role in export and internal markets. Other fruits like AVECADO, LICHI, etc can be grown here due to favourable geographic and climatic conditions. These fruits are in great demand in international market. Similarly, cowpea and bitter gourd are known to have good takers in UAE and other countries. The setting up of AEZ will be a great relief to the farmers of Wayanad who are now looking for new avenues of HOPE.

Black Pepper, a native to India originated in the evergreen forests of the Malabar Coast is considered to be the king of spices. India is the leading producer, consumer and exporter of pepper. In Wayanad district "Wayanad Pepper" is cultivated in most part of the district as it has distinct characters and is preferred by overseas market. In Wayanad nearly 1 lakh families are involved in pepper cultivation. Pepper is the major source of income and employment to the rural households in the hilly tracts of Kerala State. Kerala State accounts for nearly 97.4% of the total area and pepper cultivation in the Country. As Wayanad is a traditional pepper growing area the inputs for cultivation and processing are readily available within the district.



Out of the total coffee area in Kerala, more than 80% is in Wayanad. Robusta coffee is the major variety, which is grown in more than 99% of the total area under coffee. The yield potential of robusta coffee in Wayanad is reported to be 1400 and 2500 Kg./ha. under rain fed and irrigated conditions respectively. Quality of well-processed Wayanad robusta coffee is found to be good. Robusta is generally used as a blend in the brew with Arabica. Besides, there is a good demand for washed robustas in international market.

Wayanad is the only one district in Kerala which shares boundary with Two States, namely Tamil Nadu and Karnadaka. However, this advantage of Wayanad especially for the agriculture development has not been exploited even now although many developmental activities have been initiated. The varietal diversity of exportable products, the geographical and climatic specialities, the aptitude of the farmers to adopt innovative farming etc are favourable point to be considered for taking the decision to set up AEZ in Wayanad.

In short, Wayanad district has got tremendous advantages among the other districts of Kerala to emerge as a leading agro-producer and exporter in case of fruits, vegetables, spices, beverages and medicinal & aromatic plants. More than 80% of the agricultural commodities /products of the district is dependent on home and international markets. Out of the most common products grown organically in India products like tea, spices, fruits, vegetables, Rice (scented), coffee, herbs etc are popular in Wayanad and many of them can claim **geographic specialities**. Products from here will have thus, comparatively advantages due to special characteristics. Hence, it is all the more important to include Wayanad in the list of recently declared Agri Export Zones from the state and develop it as an Epicenter for the production and marketing of Medicinal & Aromatic plants and Spices.



**MEDICINAL & AROMATIC PLANTS**  
*N. Anil Kumar, R. Venugopal, Ajith Prasad Jain,*

**Chapter III**  
**MEDICINAL & AROMATIC PLANTS**  
**PROSPECTS OF WAYANAD DISTRICT**

**SUMMARY**

The international market of herbal products is estimated to be US \$ 62 billion. India's share in it is only 0.5%. This shows, India has to go a long way in the herbal market though this country is endowed with over 7000 species of Medicinal Plants and has nearly 5000 years of herbal health care tradition. In India, the Kerala State can play a major role in herbal market as noted by the WTO Commission of Kerala 2003 in their report "it would be desirable to develop the region extending from the Silent Valley Biosphere Reserve up to Wayanad as a Herbal Bio-valley, on the model of the Silicon Valley for computer software. The herbal bio-valley should provide the biological software essential for a dynamic medicinal plant industry". Wayanad is one such Centres of "biological softwares" in the State, and falls in the list of 29 Plant Diversity Centres identified from Western Ghats. Following facts tell the unique strengths of Wayanad district in the field of medicinal plant development.

- Highly fertile land with abundant rain and sunshine
- Presence of over 650 medicinal plants
- Rich traditional knowledge on health care systems
- Cultivation of medicinal rice varieties
- Large collection Centre of NTFP
- Over 30% of forested area with abundant biomass
- Diverse kinds of peoples' institutions like NGOs, SHGs, Farmers' Forums, Political forums, youth clubs etc.
- Strategic geographic position of the district (Well connected by road traffic between cities like Bangalore, Mysore, Calicut, Kannur and Nilgiris.)
- The presence of institutions like MSSRF/RARS, Ambalavayal
- Availability of skilled labour force.
- Presence of innovative planters and farmers

Notably, NGOs, Agricultural Department and Research Stations are carrying out several integrated programmes in the district, towards training and education in the collection, conservation, cultivation and utilization of medicinal plants. The Forest Department is also active in conservation as evidenced by the declaration **Medicinal Plant Conservation Area** (MPCA) in Mananadavady Forest Division. KIRTADS- an organization for tribal welfare proved their presence in the district by taking highly appreciative efforts of protecting the ethnic knowledge and biodiversity. A large number of women groups trained women groups by various agencies like *MSSRF*, *Vanamoolika* and *Janasoukya* on primary health care formulations exist in the district, especially in Vythiri and Sultanbathery talukes. They are all to be brought under one federation or society for growing medicinal plants and engage in value addition.

The National Medicinal Plant Board has recommended large- scale cultivation of 32 species of medicinal plants in which 20 species can be cultivated in Wayanad. M S S R F will be able to mobilise farmers and women SHGs to form their groups and cultivate these species. Good quality planting material of all these species could be raised in the nursery of MSSRF in Wayanad and supplied to farmers at a nominal cost. A raw drug collection centre also could be established with

their guidance and by taking help of the district marketing authority. Apart from this, preparation of simple training manuals in conventional and CD forms on various aspects of medicinal plants could be prepared.

The recent price crash of several cultivated crops have made Wayanad farmers to go for cultivation of Medicinal Plants. It is becoming more popular among farmers, especially among the planters in the district. There are various species of plants with medicinal uses cultivated as cash crops or food crops in this region, but often by adopting chemical manuring. Njavara – a traditional medicinal rice variety, which widely used in Ayurvedic industry, for treating rheumatic complaints is one example to be cited in this context (see Box I in the report). Though this variety has got high demand, there is no wider cultivation of this variety in Kerala..

Institutional Support in areas like Quality assurance, quality standards, value addition, processing, post harvest handling, marketing and for awareness & training will be sought from appropriate agencies like AVS, Kottakkal and MSSRF, Kalpetta. An area of ca. 500 ha in the district could be identified for the cultivation for Medicinal Plants. Setting up of following facilities would boost up this industry and it can set a fine example for the sustainable utilisation of our genetic resources for the economic prosperity.

- **Nursery Centres for Medicinal Plants**
- **Research & Development Centre for Medicinal Plants**
- **Medicinal Plant Information Centre**
- **Processing Units** (Collection and Packing units) **& Value addition Centres**
- **Promotion of Herbal Tourism**
- **Herbal/Ayurvedic Parks for Herbal Manufacturing Units.**

Considering the unique strengths of Wayanad district, this area should be given high importance to develop it as an Epi-centre for herbal industry in Kerala. This could be possible, if there is a political will to translate our ideas and potentials into action. Let us work with a shared vision and take necessary steps to convert all our potentials into production.

## Chapter III MEDICINAL & AROMATIC PLANTS

### I. The Trade Trends

According to National Medicinal Plant Board, the value of medicinal plants related trade in India is of the order of 5.5 billion US \$ (Exim-Bank Report 1997) and is further increasing day after day. The international market of herbal products is estimated to be US \$ 62 billion, in which India's share is only 0.5%. This shows, India has to go a long way in the herbal market in spite of the fact that this country is endowed with over 7000 species of Medicinal Plants spanning nearly 5000 years of herbal health care traditions. The comparative advantage of India in the global sector of herbal medicine is not only the existence of traditional health care systems like Ayurveda, Sidha and Unani, but also its diverse biotic wealth and the ethnic- herbal knowledge cutting across over 4,600 communities of the country.

#### I (a). *The Indian Scenario*

The current level of international trade in medicinal plants is reported to be US\$ 800 million. This has been the average annual value over the years 1992-1995 according to the UNCTAD database, International Trade Centre, Geneva. China tops the list of exporting countries with an average annual export volume of 1,21,900 tones valued at US\$ 264.5 million. India is next, recording an annual export volume of 32,600 tones valued at US\$ 45.95 million. Among the importers of botanical drugs, Hong Kong is at the top with 77,250 tones (\$ 133.7 million), followed by Japan with 43,500 tones (\$ 114.5 million), Germany with 42800 tones (\$ 96.25 million) and USA with 35,000 tones (\$ 95.20 million). These assessments of international trade in medicinal plants include plants and their parts like roots/tubers, wood, bark, leaves, flowers, fruit/seeds etc..

The herbal market in the country today is unorganized due to various reasons. There is a substantial volume of internal trade in medicinal plants in India. The nature and dynamics of this domestic trade, and in most other developing countries as well, is far from simple. It involves central and regional markets through a number of private dealers and agencies, government or government controlled corporations and cooperatives all having upstream linkages with numerous local and "road-head" markets, which in turn have myriad middlemen, petty shopkeepers and agents feeding them with primary supplies.

Table. 1. Value of world trade in medicinal plants from 1987 to 1991

Year	Trade value (1000 US\$)	
	Imports	Exports
1987	960.39	733.38
1988	1,046.61	829.64
1989	1,059.38	795.79
1990	1,122.87	901.87
1991	1,080.12	694.25
Average	853.87	590.99

Source COMTRADE database.

Singapore and Hong Kong are the main re-exporters of medicinal plants in Asia. Japan, USA, Germany, France, Italy, Malaysia and Spain are the major markets. Hamburg is the world-trading centre in medicinal plants. About 53 countries supply medicinal plants to Germany, of which important ones are India, Argentina, China, Poland, Egypt, Hungary, Netherlands and France. The Chinese export based on plants including raw drugs, therapeutics and other is estimated to be around Rs. 18,000 – Rs. 22,000 Crores. According to Planning Commission's Task Force Report 2000, India at present exports herbal materials and medicines to the tune of Rs. 446 crores only while it has been estimated that this can be raised to Rs. 3000 crores by 2005. India exports crude drugs mainly to developed countries viz. USA, Germany, France, Switzerland, UK and Japan. The principal herbal drugs that have been finding a good market in foreign countries are *Aconite*, *Aloe*, *Belladonna*, *Acorus*, *Cinchona*, *Cassia tora*, *Dioscorea*, *Digitalis*, *Ephedra*, *Plantago (Isabgol)*, *Cassia (Senna)* etc

## **I (b). The Kerala Scenario**

Ayurveda is very popular in Kerala. According to FRLHT there are 7000 A Class and 6000 B Class medical practitioners in Kerala. The number of unregistered medical practitioners (Folklore System) is about 5000. There are 750 licensed Ayurvedic drug 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 crores in Kerala. Among the raw drugs used, only 7 per cent is obtained from cultivated sources. There are three kind of trade structure existing in medicinal plants trade as shown below, in which the first kind of trade where plant collector or cultivator directly linked to the seller is a rarest. Intermediary play a significant role in the trade, but unfortunately it is largely secretive in nature as there is no declared market for raw drugs or fresh picks from herbal gardens.

1. Collector/cultivator (Primary supplier) => Seller => Consumer
2. Collector/ cultivator => Intermediary => Seller => Consumer
3. Collector/cultivator=>IntermediaryI=>IntermediaryII=> Seller => Consumer

## **I (c). Prices**

Prices of many medicinal plants, particularly those collected from the wild sources, tend to vary in a cyclic manner. Price cycles of 6 – 7 years are common as the availability of many plants goes from over supply to scarcity very quickly and then takes several years to return to normal. The prices of plants traded directly by the user companies are never published. Also the traders are reluctant to divulge the sources of plants.

## **II. Medicinal Plant Cultivation in Kerala**

The recent price crash of several cultivated crops have made Kerala farmers to go for cultivation of Medicinal Plants. It is becoming popular among the farmers, especially those who live close to Ghat regions, which are rich in natural resources and biodiversity.

However, through a careful analysis, one can see that a majority of cultivated medicinal plants are exotic, which otherwise is not available in wild for collection to meet the demand of the industry. For example, now famous medicinal or aromatic plants among the farmers of Kerala and Karnataka like Anato (*Bixa orellana*), Safed musli (*Chlorophytum brovelianu*), *Stewia* and *Pepper mint (Mentha piperita)* are not indigenous to India. At the same time there are several indigenous plant species that have high commercial demand and are still collected from wild and becoming very rare, but not successfully introduced for cultivation. For instance, National Medicinal Plant Board listed all the medicinally important orchids as very rare or endangered and disqualified for exporting such materials collected from the wild. Another such notable species listed as banned species for export is *Cycas circinalis*, which is a gymnosperm plant (gymnosperm itself is an endangered plant group in south India) with varied uses as medicine, food, decoration etc. for its seeds, pith and leaves respectively. The natural vegetation of this species is rapidly getting lost due to conversion of its habitats for other uses like plantations of Cassava, Rubber etc. In Malabar region (Calicut and Malappuram districts) of Kerala, this endangered tree is being conserved at household level as individuals primarily because of the interest of women of the households. The Wayanad belt of Kerala is ideal for its large scale cultivation.

There are various species of plants with medicinal uses cultivated as cash crops or food crops usually by adopting chemical manuring. Njavara – a traditional medicinal rice variety of Kerala is a good example of such a crop using organic manures. This variety of rice is being used widely in the Ayurvedic industry, mainly for treating rheumatic complaints. But this is not in wide cultivation anywhere in Kerala and a study by MSSRF shows in the name of Njavara a number of other Njavara look like varieties are available in market. Like wise all the major spices -Pepper, Cardamom, Ginger, and Nutmeg – that are in high demand for the medicine industry are also cultivated mainly as plantation crops with very high input of chemical manures and pesticides.

As in case of previously mentioned *Cycas circinalis*, there are several minor spices and women have conserved in the State, aromatic plants at homestead level as backyard plants, for example, Kasthurimanjal (*Curcuma zeodaria* & *Curcuma aromatica*), Arrowroot (*Maranta arundinacea*), Turmeric (*Curcuma longa*) Mango ginger (*Curcuma amada*), Chengazhi (*Kaempferia rotundifolia*), Vayambu (*Acorus calamus*), Kacholam (*Kaempferia galanga*) are still available at household level again due to the interest of poor rural and tribal women. Considering several factors like the rarity of the target crop/raw drugs, demand from the market, suitability of the crop for cultivation in moist regions and farmers' acquaintance with the crop etc. these species and medicinal rice

varieties like Njavara, Chennellu and pepper like Wild Pepper and orchids like *Nervilia* are few among the plants for large-scale cultivation in South India.

The National Medicinal Plant Board has recommended large- scale cultivation of 32 species of medicinal plants out of which 20 species can be cultivated in South Indian habitats. The Board has got its State Office in Kerala also.

Table 2. Export potential plants recommended by National Medicinal Plant Board, N-Delhi

Local name	Botanical name	Local name	Botanic name
Ashokam	Saraca asoca	Kacholam	Kaempferia galanga
Pathimugham /Chappangam	Caesalpinia sappan	Brahmi	Bacopa monnieri
Koovalam	Aegle marmelos	Pachila	Pogostemon sp.
Palakappayyani	Oroxylum indicum	Koova	Curcuma zeodaria
Kumizhu	Gmelina arborea	Kaattupadavalam	Trichosanthes lobata
Kanikkonna	Cassia fistula	Shathavari	Asperagus racemosus
Nellikka	Embllica officinalis	Chittaratha	Alpinia galanga
Neelayamari	Indigofera tinctoria	Paal Muthakku	Ipomaea digitata
Thippali	Piper longum	Kurangu Manjal	Bixa orellana
Iruveli	Coleus zeylanicus	Safedu Musali	Chlorophytum borivilanum

#### Box. 1

### Kerala Medicinal Plant Development Board (KMPDB)

#### *Objectives of the Board*

- Self- reliance in medicinal plants for industrial need
- Economic growth of the state based on manufacture of medicines and export.
- Aim at self- reliance in basic health care system through medicinal plants.
- Setting up a Medicinal plant export Zone in Kerala.

#### *Some of the proposed activities*

Inventory of the following

- Cultivators of Medicinal Plants.
- Those who maintain nurseries
- Manufacturers of Ayurveda medicines.
- Traders in raw drugs
- Exporters of Ayurveda medicines and related products.

#### *Data Bank*

A data bank of export potential, domestic market potential, market fluctuations etc. should be started. The data should be helpful to the authorities for formulating policies on Medicinal Plants and



medicine manufacturing sector.

### ***Medicinal Plant cultivation***

Keeping in view the requirement of the manufacturing industry, strategy for cultivation of medicinal plants should be evolved. The Plan should focus on cultivation of annuals etc. by growers in the private sector, the Board and other Government agencies should plan for cultivation of tree crops badly needed by the industry. Long gestation crops like *Koovalam, Nelli, Asokam* etc. may not be found acceptance for growing among individual farmers. Therefore a perspective plan for the next 10 years should be drawn up. Schools, Colleges, religious institutions etc. should be encouraged to grow medicinal plants in their compound. If need be assistance for protection should be afforded to plants in the school/college compounds.

### **Publicity and Extension**

There is need to give wide publicity to the functions of the Board and schemes.

Bring out the cultivation practices, harvesting and use and economics etc. of some important species of Medicinal Plants. (At least six during the year)

Publicity for the need for conservation of bio-diversity with special emphasis on medicinal plants

## **III. Agri Export Zone: The Prospects of Wayanad**

### **III (a). Background**

The Report of the Commission on WTO concerns in Agriculture Trade Security System of Kerala (January 2003) emphasized the importance of Herbal Medicine and Ayurveda in the economic growth of this State. Six major steps to promote the untapped potential of the herbal wealth of the State have been recommended in the report. They are: Genetic Resources Conservation and Sustainable Use, maintaining the Purity and Authenticity of Ayurveda, establishing Growers Associations for medicinal plants, establishing Herbal Sanctuaries & Herbal bio-valley and educating public about the Protection of Plant Varieties and Farmers Rights and Biodiversity Acts. An integrated approach of all these six components and a political will to take this into action will certainly lead into remarkable changes in agricultural developmental sector.

The initial step to be taken in this direction is the identification of areas rich in both medicinal plant diversity and herbal men and women. Such areas could be recommended for developing herbal sanctuary or a part of herbal bio-valley. The WTO Commission Report states, "It would be desirable to develop the region extending from the Silent Valley Biosphere Reserve up to Wayanad as a Herbal Bio-valley, on the model of the Silicon Valley for computer software. The herbal bio-valley should provide the biological software essential for a dynamic medicinal plant industry". There are such

centers of “biological softwares” in the State, but identification of such areas should be done based on authentic field level verification. Wayanad is a locality that falls in the list of the 29 Plant Diversity Centres identified from Western Ghats that are rich in medicinal plants.

Considering the unique strengths of Wayanad district, this area should be given high importance to establish necessary production and marketing infrastructure. Moreover, several integrated programmes are being carried out in the district, notably by NGOs, Agricultural Department towards training and education in the collection, conservation, cultivation and utilization of medicinal plants. The Forest Department is also very active in conservation as evidenced by the declaration **Medicinal Plant Conservation Area (MPCA)** in Mananadavady forest division of the district. KIRTADS an organization for tribal welfare is also proved their presence in the district by taking highly appreciative efforts of protecting the ethnic knowledge and biodiversity.

A large number of women groups have been trained by various agencies like MSSRF, Vanamoolika and Janasoukya on primary health care formulations exist in the district, especially in Vythiri and Sultanbathery talukes. They are all brought under one federation or society for growing medicinal plants and engage in value addition and will lead to the socio- economic development of rural women.

Why AEZ for Medicinal Plants to be promoted in the District?

Table 3. The Livelihood Dimension – AEZ Medicinal plant, Wayanad

<p style="text-align: center;"><b>INDIVIDUAL ORIENTATION</b></p> <p>To keep the hopes of the individuals high by way of good earning and health security.</p> <p>To avoid the fear of traditional communities that their knowledge and material are exploited unethically</p>	<p style="text-align: center;"><b>FAMILY-ORIENTATION</b></p> <p>To preserve the ancestors knowledge and skills in wild plant management and its folk/ayurvedic remedial utilization</p> <p>To improve the income of the plant-dependant poorest communities.</p>	<p style="text-align: center;"><b>COLLECTIVE ORIENTATION</b></p> <p>To improve the traditional methods in conservation of plant and animal species</p> <p>To supply the community entrepreneurs good quality and genuine raw materials.</p>
<p style="text-align: center;"><b>INNER- HUMAN SPACE</b></p> <p>To enhance the awareness level of farmers, traditional healers, Ayurvedic doctors and the consumers regarding the identity, usefulness and application of the medicinal plants</p> <p>To improve the responsibility of foresters, traders and healers in protecting, selling and sustainably using the medicinal plants</p>	<p style="text-align: center;"><b>FAMILY SPACE</b></p> <p>To improve the health and nutritional security of family and communities</p> <p>To increase the women's share of income to family and thereby their status at family/community level</p>	<p style="text-align: center;"><b>SOCIO-ECONOMIC SPACE</b></p> <p>to utilise land for fetching additional income by cultivating medicinal plants to get additional employment to create opportunities for Women SHGs</p> <p>to reduce drug production cost</p> <p>to get health care more equitable way</p> <p>to reduce government health care expenditure</p> <p>To exploit the potential of economical, ecological and cultural values of the species.</p>
<p style="text-align: center;"><b>EMOTIONAL BASIS</b></p> <p>To maintain the cultural attachment of the people with many of the med plant species.</p> <p>To make medicinal plants to survive at in-situ and avoid its extinction</p>	<p style="text-align: center;"><b>KNOWLEDGE &amp; ACTIVITY BASIS</b></p> <p>To develop (validate) TK on medicinal plants using modern technology, market demand and modern science</p> <p>To improve the employment opportunities of the poorest of poor people especially women</p>	<p style="text-align: center;"><b>PHYSICAL BASIS</b></p> <p>To protect the endangered species and habitats in order to maintain/increase the species richness and landscape complexity</p> <p>To maintain habitats for other associated floral and faunal diversity with the medicinal plant species.</p>

#### IV. A “SWOT” Analysis in terms of the Cultivation and Exporting/marketing

Table 4. SWOT analysis

<b>Strength</b>	<b>Weakness</b>
<ul style="list-style-type: none"> <li>• Rich traditional knowledge on health care systems</li> <li>• Presence of over 650 medicinal plants</li> <li>• Cultivation of medicinal rice varieties</li> <li>• Large collection Centre of NTFP</li> <li>• Highly fertile land with abundant rain and sunshine</li> <li>• Over 30% of forested area with abundant biomass</li> <li>• Presence of divers kind of peoples’ institution like NGOs, SHGs, Farmers’ Forums, Political forums, youth clubs etc.</li> <li>• Strategic geographic position of the district (Well connected by road traffic between cities like Bangalore, Mysore, Calicut, Kannur and Nilgiris.)</li> <li>• The presence of institutions likes M. S. Swaminathan Research Foundation that studies and popularises the herbal wealth.</li> <li>• Availability of skilled labour force.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of transparent and open marketing opportunities</li> <li>• Absence of information on demand &amp; market price</li> <li>• Poor infrastructure for value addition, storage, sanitary and phyto-sanitary measures</li> <li>• Poor lobbying capacity of the people of the district</li> <li>• High labour charge</li> <li>• Unrestricted exploitation of wild collection of precious medicinal plants which limits the scope of economic cultivation</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Increasing internal &amp; export demand for medicinal plants /drugs due to acceptance and popularity of Ayurveda system</li> <li>• Introduction of GMP and quality systems which requires quality inputs, will promote economic cultivation of medicinal plants</li> <li>• Development of new drugs and formulations from plant origin</li> <li>• Export potential for herbal extracts &amp; semi processed drugs</li> <li>• The growing political interest on herbal health</li> <li>• Industries WTO Kerala Commission’s recommendations to set up a “herbal biovalley” starting from Silent Valley to Wayanad.</li> <li>• The growing trend in Wayanad towards organic agriculture</li> <li>• Very conducive environmental setup for maintaining a wide germplasm of medicinal plant diversity</li> <li>• A great potential for Herbal, Eco and Farm tourism</li> </ul>	<ul style="list-style-type: none"> <li>• Aggressive marketing strategies adopted by China, which is the main competitor in export market opportunities</li> <li>• Absence of organised, scientific documentation of traditional knowledge</li> <li>• The vested interest of decision makers</li> </ul>

#### V. Plants recommended for the Cultivation in Wayanad

Table 5. Plants recommended for cultivation.

Local name	English name	Botanical name
Kattaar vaazha	Aloe	<i>Aloe vera</i>
Vayampu	Sweet flag	<i>Acorus calamus</i>
Thulasi	Holy basil	<i>Ocimum sanctum</i>
Sathavari	Asparagus	<i>Asparagus racemosus</i>
Brahmi	Bacopa	<i>Bacopa monnieri</i>
Pathimugham	Sappan wood	<i>Caesalpinia sappan</i>
Naykkuruna	Cow witch plant	<i>Muccuna preceriens</i>
Koduveli	Rosy	<i>Plumbago indica</i>
Stevia	Stevia	<i>Stevia rebaudiana Bertoni</i>
Pacholi	Pacholi	<i>Pogosteman pacholi</i>
Savam naari	Periwinkle	<i>Catharanthus roseus</i>
Ashwa gandha	Winter cherry	<i>Withania somnifera</i>

## VI. The Cost Benefit analysis of some important medicinal plants

(Market for medicinal plants and production is highly volatile. The economics worked out here are subject to fluctuations, depending upon time and date. The cost calculation was made on the basis of discussion conducted with the cultivators (both small and large scale) and converted into specific unit under mono-crop mode. Revenue was calculated on the basis of expected yield and existing unit price for the plant in raw form)

### VI. (1). *Kattarvaazha* /Acre

Cost of production in the first year = 80,000  
 Second Year = 25,000  
 Third year = 25,000

Income from the first year = 55500 (Rs. 10 /kg) (yield = 500gm/plant)  
 Second Year = 222000 (yield = 2 kg /plant)  
 Third Year = 222000 (yield = 2 kg /plant)

**Net income for three years = 369500**

### VI. (2). *Vayampu*/Acre

Production cost  
 First year = 20,000  
 Second year = 10,000

Yield 360 Kg dry

Not viable in terms of existing price

### VI. (3). *Thulasi*/Acre

Total cost for three years =60,000  
 Total income for 3 years = 2,00,000

Net income for 3 years =1,40,000

(The crop is harvested at full bloom stage. The first harvest is obtained at 90-95 days of planting. Then it may be harvested every 65-75 days interval)

**VI. (4). *Sathaavari/Acre***

Production cost for 3 years = 40,000  
Total income for three years = 1,00,000  
Net Income for three years = 60,000

**VI. (5). *Brahmi/Acre***

Total production cost/ acre = 15,000  
Total income from one acre = 50,000  
Net income per year = 35,000

**VI. (6). *Pathimugham/Acre***

Total cost of production for 7 years =1,00,000  
Total income = 5,00,000  
Net income = 4,00,000

**VI. (7). *Naikkuruna/Acre***

Total cost of production per acre = 13600  
Total income from one acre = 33400  
Net income per acre = 19800

**VI. (8). *Koduveli/Acre***

Cost of production/acre for 2 years = 18000  
Income from one acre for two years = 145200  
Net income for two years = 127200

**VI. (9). *Stevia/Acre***

To be experimented

**VI. (10). *Pacholi/Acre***

Cost of cultivation for three years = 85,000  
Income for 3 years = 1,44,000  
Net income = 59,000

## **VI. (11). *Savam Naari/Acre***

Total cost of production	= 11,000
Expected income	= 20,000
Net income	= 9,000

(These assumptions have been made based on monocropping system. Efforts must be made to introduce Medicinal Plant cultivation within existing cropping systems and link them to value addition by women SHGs and or collection for sale to markets.)

## **VII. Production**

### **a). *Area of cultivation***

An area of ca. 500 ha in the district could be identified for the cultivation for Medicinal Plants. The following villages are identified

- Vythiri Taluk
  - (a) Kottathara-50 ha.
  - (b) Chooralmala- 100 ha.
  - (c) Vaduvanchal - 50 ha.
  - (d) Pozhuthana 100 ha
- Sulthan Bathery Taluk
  - Pulpally & Mullankolli Area 200 ha.

The cultivators will be of Farmer Groups and women SHGs. A few planters also could be brought under the programme. Planting materials of the species identified for this programme will be raised and given from the Community Agrobiodiversity Centre of MSSRF in Kalpetta.

### **VIII.(b). *Organisational setup***

For ensuring consistent supply of medicinal plants, arrangements for contract farming may be proposed

Leading Pharmaceutical companies, interested private entrepreneurs and co-operative societies can invest in processing and value addition of medicinal plants for export. Setting up of a common facility centre with GMP license for processing and value addition will be ideal, where women SHGs can produce certain effective formulations already in their domain.

A large number of women groups have been trained by various agencies like MSSRF, Vanamoolika and Janasoukya on primary health care formulations exist in the district, especially in Vythiri and Sultanbathery talukes. They are all brought under one federation or society for growing medicinal plants and engage in value addition.

#### **VIII. (c). *Awareness & training***

Preparation of educational materials, charts, posters, video films etc in local language will be initiated with the help of competitive organizations in this field. Following other activities will be taken up in this context. A high level advisory committee will be formed to guide the concerned in all aspects of medicinal plant development from seed level to market level information.

Building up databases in medicinal species and the traditional healers of the Malabar region.

Education and Information empowerment of students and teachers and general public

Training SHGs in the preparation of alternative health care products

Developing community level herbal gardens

Helping community level marketing of the health care products

#### **VIII. (d). *Input mobilization***

Inputs required for all the medicinal plant development will be sought from MSSRF and AVS, Kottakkal

#### **IX. *Quality Assurance***

##### **IX.(a). *Quality standards***

All necessary quality standards exist in this sector in plant collection to identification and storage will be strictly followed.

##### **IX.(b). *Post harvest handling***

Assistance from M S Swaminathan Research Foundation and Arya Vaidya Sala, Kottakkal will be sought on post harvest, extraction and marketing techniques.

#### **X. *Value addition & Processing***



Ayurvedic Pharmaceutical companies like AVS and Deseeya Ayurveda Pharmacy will be invited to help the federation formed in this district in this aspect.

## **XI. Marketing**

Marketing will be started only after proper buy back arrangements have made with the buyers through agencies like Sanjeevani in Kottakkal & Women Biotechnological Park in Chennai. Some institutions like MSSRF or Regional Agricultural Station, Ambalavayal will be requested to verify the quality standards of the raw drugs collected. The collected materials will be stored in an appropriate facility with the help of Agricultural department.

## **XII. Infrastructure Development**

### **XII.(a). *Production***

Infrastructure needed for simple value addition is required, for instance distillery units, drying facilities etc. are to be built up.

### **XII.(b). *Quality assurance, value addition and marketing***

Technical assistance from MSSRF and AVS, Kottakkal will be sought.

### **XII. (c). *Institutional Support***

Financial assistance for establishing the Agricultural Export Zone on Medicinal Plants will be sought from the Central and State Medicinal Plant Boards.

## **XIII. Conclusions & Commitments**

### **XIII. (1). *Chemical Free Cultivation of Medicinal Plants***

According to a study of KFRI (Sasidharan & Muralidharan 2000) only seven percentage of total consumption of raw drugs in Kerala is met by the cultivation, while 93 percent is still met through collection from the wild. The situation thus warrants the supply of good

quality raw drugs cultivated and marketed by ensuring relevant quality control measures. Several species have got high demand, for example, Kacholam has got an annual demand of 748956kg, in Malabar region alone. Likewise, Chengazhi (17487kg), Kasthuri Manjal (13271kg) and Vayambu (89875 kg) are used heavily in Kerala. Hence, we feel that by decaling AEZ initiatives towards cultivation of medicinal plants wherever possible could be taken up. Organic farming will be encouraged with a view to utilize the biomass available *in situ* and the herbal raw drugs produced in this manner must be ensured to get a premium price. Any chemical contamination of herbal products through fertilizers or pesticides will be avoided by all means. Help of certification agencies with emphasis on GMP/GAP/ organic cultivation will be sought in this context. The intervention in cultivation of medicinal plants will look into following several aspects.

- On farm conservation of medicinal plant germplasm with maximum genetic variability
- Involvement of women in cultivation.
- Literacy movement on chemical free cultivation and sanitary and phyto sanitary measures
- Care in processing and grading of Raw Drugs
- Linking farmer groups with the market after proper buy-back agreements.
- Formation of micro enterprises on nutraceuticals.
- Promotion of eco-technologies like vermi/ bio-composting, bio-pesticide etc.
- Linking the medicinal plants cultivators with market.

### **XIII. (2). *Genetic Garden Centres for Medicinal Plants***

Although farmers in the district are interested in the cultivation of medicinal plants, there is no ready supply of planting materials for the species in demand as of today. There is a dearth of availability of good quality planting materials. Therefore, the farmers and women SHGs will have to be encouraged by providing supplying good quality mother seeds/planting materials and infrastructure for rapid multiplication etc. through competent technical institutions in the district. This would help in the timely availability of planting and seed materials. In this context, plant nursery units at centralized and village level will be initiated. Setting up of a tissue culture lab will certainly help to a significant extent to solve the problem of large-scale supply of the species required for cultivation.

### **XIII. (3). *Research & Development Centre for Medicinal Plants***

The geographical advantages of Wayanad reflected in the properties of several medicinal plants cultivated in this district are to be investigated in a scientific manner. Products like honey, amla, wild pepper, turmeric, wild turmeric, ginger etc collected from the forests of Wayanad are characteristically different in properties from such products from other geographic locations. Studies will be started in partnership with organizations like MSSRF to understand the genetic variability of the different species of medicinal plants present in the district will be taken up once the AEZ is declared for medicinal plants in the district. And the result of such study will be correlated with the knowledge associated with such materials in the realm of ethnic system, ayurveda and modern sciences. Such a Centre should have Laboratory facilities for quality test of the products and raw drugs.

**The Community Agrobiodiversity Centre of M S Swaminathan Research Foundation** has done some notable work in the district for the promotion medicinal plants. M S S R F will be able to mobilise farmers and women SHGs to form their groups to cultivate about 20 species that are recommended by the National Medicinal Plant Board. Help of this organization is ensured for good quality planting material of all these species and supplied to farmers at a nominal cost. A raw drug collection centre also could be established with their guidance and by taking help of the district marketing authority. Apart from this basic research in the sector of medicinal plant taxonomy, anatomy and ethnobotany has been offered by MSSRF.

### **XIII. (4). *Medicinal Plant Information Centre (MPIC)***

Institutional back up for extending technical support to farmers, production of quality seedlings of selected plants and providing useful information about plant species, their cultivation, storage and marketing methods is very essential. Therefore, an information

Centre giving all the details from seed collection to value addition and market could be started by constituting scientific experts, herbal healers, Ayurvedic doctors, pharmaceutical people and forest officials. In this context, it is requested to strengthen the activities of Kerala State Medicinal Plant Board and ensure that it reaches to all those interested in medicinal plant cultivation.

### **XIII. (5). *Resource Centre for dealing with Farmers' Rights***

An institution already exists to deal with this subject in the district. Their efforts will have to be further strengthened to function as a Centre of excellence for facilitating field level implementation of the provisions relating to Farmers Rights and the prior informed consent and benefit sharing provisions of Biodiversity Act of India. Such Centre will try to achieve this mission by looking into the following vital areas of Medicinal Plant Conservation Research and Development.

- Protection, conservation and enhancement of genetic and species diversity of medicinal plants -the key resources upon which Wayanad district depends for its health security and has high potential for its economic prosperity.
- Improvement of the livelihood opportunities of the tribal and rural poor men and women through the development of medicinal plant sector.
- Development of an information base on traditional knowledge and medicinal plant genetic wealth in order to facilitate the field level implementation of the provisions relating to Farmers Rights and Biodiversity Conservation.

### **XIII. (6). *Processing Units (Collection Centre and Packing units) & Value addition Centres***

Small- scale Raw drug collection centres at Panchayath level will be promoted, and collections from such centres could be pooled to a couple of semi- processing units equipped with good storage facilities in some selected localities depending upon the degree and level of cultivation of medicinal plants. A central processing unit cum export unit will be started in the district with all modern facilities.

This Central unit can function as a supply unit for exporters/ domestic markets/ manufacturing industry etc. It may be mentioned here that the policies on good manufacturing practices should be critically reviewed by looking into the needs of communities and the quality standards in relation to the Indian Traditional Standards.

### **XIII. (8). *Promotion of Herbal Tourism***

Herbal or Ayurvedic Tourism has high potential in the district, thanks to its salubrious climate and rich herbal wealth. The landscape diversity that varies from forests, bushes, thickets, rocky grasslands, fallow fields, springs, streams, canals and wetlands- a fine example of a heterogeneous ecosystem as well as the rich ethnic diversity with unique health care knowledge and practices provide an ideal situation for Herbal tourism. Ayurvedic Resorts are mushrooming up in the district, which shows the potential of the district in this domain. The declaration of AEZ could pave the way to boom this sector as well, which results in double benefits to the people of this district.

### **XIII. (9). *Herbal/Ayurvedic Parks for Herbal Manufacturing Units***

A sizable percentage of income of the common man is spent towards health care needs, thus along with the education and awareness programmes, the production of herbal products will be encouraged. The cost of present day herbal drugs, cosmaceuticals and nutraceuticals is very high and not affordable to the common man and women. Hence, Good quality production and storage will be ensured in case of these products in a cost-effective manner at community level. The women SHGs will be trained by skillful and qualified herbal practitioners in such venture, who can produce single primary health care drugs and diverse kinds of cosmaceuticals and nutraceuticals. Moreover, Wayanad is well connected with major cities like Bangalore, Kozhikode, Kochi, Mangalore, Coimbatore etc. So it will be easy to attract Tourists to this destination. Therefore, setting up of a Herbal Park in the district with the features that can attract health conscious tourists will be explored.



**SPICES (Pepper & Vanilla)**

**SPICES (PEPPER, VANILLA & GINGER)**

**Summary**

Pepper is one of the oldest commercial crops cultivated in Wayanad District. Wayanad is the second largest producer of pepper covering an area around 44908 ha in 2000 – 2001. Pepper is cultivated in homestead garden as mixed crop with coffee, areca and etc. The pepper produced in this district is superior in quality because of its inherent natural qualities. Wayanadan pepper (Malabar and Telichery pepper) has got premium price in international market. Pepper from India is mainly marketed as Black Pepper and there are good markets for value added pepper products in European countries and the US. Institutional and monetary support for producing value added products will boost the export potential of pepper from Wayanad and will increase the profit of pepper production. The demand for organic pepper is growing rapidly. Wayanad can double her production and foreign earnings through the use of geographical peculiarities and proper utilisation of rich biomass. A good indication for future prospects of pepper in Wayanad is the on-going developments in organic cultivation, which take place in Marappanmoola village of Pulpally. The humid tropical forest environment and the optimum altitude of 700-900 m of the district is ideal for luxuriant growth of this species. Cultivated *Piper nigrum* and species like *P. galeatum*, *P. sugandhi* and *P. wightii* co- exist in many localities in Wayanad, which also may have contributed to the special properties of Pepper in Wayanad. Along with improved varieties like Panniyur 1, 2, 3, & 4, the traditional cultivars such as *Wayanadan*, *Karimunda*, *Kalluvalli*, *Kuthiravally*, *Kottanadan* and *Iyimpiriayan* are also widely cultivated in the district. In brief- in terms of area and production, inherent qualities of Wayanadan pepper and prevailing market advantage, scope for value addition and organic cultivation – Pepper can be treated as a priority crop for Agri. Export Zone.

Vanilla, introduced recently in Wayanad District, has got a momentum in production due to its market advantage. The suitable climate and fertile soil coupled with literate farming communities made this crop very popular in Wayanad District. International campaign against synthetic products enhanced the demand for natural products like Vanilla in the world market is projected as one of the future crops. Similarly the “Vanillin” content in Wayanadan Vanilla is comparatively high, which will help us to argue for premium price in the international market.

## **IV (a). PEPPER**

### **I. Introduction**

#### ***I.(a). History of cultivation***

Black pepper, the king of spices, is the most widely traded spice of the world. It is native to India, the evergreen forests of the Malabar coast of the Southern India is considered to be the centre of origin of pepper. India is the leading producer, consumer and exporter of pepper. In the recent years Vietnam has emerged as the competitor in export of pepper.

World production of pepper during 2002 is estimated around 3.1 lakh MT in an area of 4 lakh ha. In India pepper is cultivated in 1.9 lakh ha. with the production estimate of 80,000 MT.

#### ***I.(b). Geographical advantage and inherent qualities***

In India about 75 varieties of pepper are cultivated of which Panniur (selections 1-7), Karimunda selection (KS 14 and KS 27), Panchami, Pouranami, Kottanadan and Balankotta are most popular. Wayanad lies in the humid tropics at altitudes ranging from 900-1000 m MSL with an annual rainfall of 2000-3000 mm. The soil in most part of district is loamy rich organic matter. In Wyanad district “Wyanad Pepper” is cultivated in most part of the district as it has distinct characters and is preferred by overseas market.

#### ***I.(c). Socio- economic importance***

Pepper is the major source of income and employment to the rural households in the hilly tracts of Kerala. More than 2.5 lakh families are involved in pepper cultivation. More than 80% of them are small or medium farmers possessing land less than 2 acres. For them nearly 50% of their agriculture income comes from pepper. In Wayanad nearly 1 lakh families are involved in pepper cultivation.

### **II. Pepper Production**

#### ***II.(a). Geographical coverage***

In India pepper is cultivated in 1.9 lakh ha. with the production estimate of 80,000 MT with the productivity of 316 Kg. Per ha. which is less than the world productivity (472Kg / ha.) Kerala accounts for nearly 97.4% of the total area and pepper cultivation



Table. 1. State wise area, production and yield of pepper in India (1999- 2000)

STATE	AREA	PRODUCTION	YIELD
Karnataka	6.85	1.65	241
Kerala	184.37	56.43	306
Tamil Nadu	0.61	0.12	197
Others	0.44	0.09	204
All India	192.3	58.29	303

(Area: '000ha, Production: '000MT, yield:kg/ha)

Pepper is extensively cultivated in Idukki (49,800 ha.) and Wayanad (40,200 ha.) districts with production of 29,300 MT and 18,200 MT, respectively. In these districts pepper is cultivated in homestead garden as mixed crop with Areacanut, Coffee and Tea.

## II.(b). *Production and Productivity*

Though India occupies 50% of the world area under pepper production is only 30%. The productivity of pepper in India is very low compared to other pepper producing countries.

Table. 2. Production and export of pepper of pepper producing countries in 1999

Country	AREA	PRODUCTION	YIELD
BRAZIL	23000	22000	957
INDIA	238320	75000	315
INDONESIA	131775	44500	338
MALAYSIA	11000	21500	1955
SRI LANKA	23000	4740	206
THAILAND	1716	7000	4079
VIETNAM	20000	30000	1500
CHINA ,PR	12000	12000	1000
MADAGASCAR	4060	1600	394
MEXICO	1200	1500	1250

<b>TOTAL</b>	<b>466071</b>	<b>219840</b>	<b>472</b>
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(Area: in Ha, Production: Tonnes, Yield: kg/ha)

Low productivity of pepper is mainly attributed towards

- Old and low yielding vines occupying more than 20% of the pepper area.
- Non- availability of quality pepper cuttings.
- Non- adoption of scientific method of cultivation by farmers.

Recently Vietnam has emerged as the leading producer of pepper, production of pepper was 8625 MT in 1990 compared to 55,000MT in 2002.

### **II.(c). Cost of cultivation**

On all India basis the cost of cultivation for producing 1kg of pepper excluding the rental value of land is Rs. 22.75. Among the states the cost of cultivation of pepper is high in Kerala state (Rs. 33.59/Kg.) and lowest in Tamil Nadu (Rs. 11.08/ Kg.). Pepper is a labour intensive crop producing employment opportunity to the rural masses. On an average 178 man days per annum per ha is required, of which 60% of the production cost is attributed towards labour charges. In Kerala the labour cost has risen by 400% between the years 1980 and 1995. The cost of cultivation for 1 ha is Rs. 42,706 with the annual production of 1064Kg/ha. The cost benefit ratio is 4.5.

### **III. Price Fluctuation:**

There is greater fluctuation in the price of pepper from 1996 onwards. In 1996 the price of pepper was Rs. 215/ Kg and the current price is Rs.74/ Kg and it is forecasted that during later part of 2003 the price of pepper will be around Rs. 80/Kg.

### **III.(a). Price movement International market price**

Compared to the pepper produced in different parts of the World, price of pepper produced in India is comparatively high.

Table. 3. International market price for pepper from different producing countries

<b>Country</b>	<b>Rs./Kg.</b>
Indonesia	58.40

Vietnam	58.00
Sri Lanka	59.00
India	72.90

There is wide gap between production and supply of pepper, as result the price of pepper declined steeply in the recent years.

#### **IV. Present infrastructure facilities available**

##### ***IV.(a). Availability of all inputs***

As Wayanad is a traditional pepper growing area the inputs for cultivation and processing are readily available within the district.

##### ***IV.(b). Research Institutes***

Indian Institute of Spices Research (IISR), Kozikode, a premier institute for pepper and Kerala Agricultural University research station at Ambalavayal, are the main source of research support and technical advice on the cultivation and other related areas of pepper. Similarly Spices Board with an office of Assistant Director at Kalpetta will assist on the aspects related to post harvesting, marketing and export of pepper. As there is an increasing national and International demand for organic spices, involvement of other

agencies like WSSS, Mananthavady, HICOS, Pulpally, Brahmagiri Dev. Society, Meenangady and willing NGO's popularising organic cultivation of pepper is an added advantage.

#### **IV.(c). *Extension facility***

Spices Board, Department of Agriculture through Krishibhavans, Krishi Vigyan Kendra, Ambalavayal, UPASI, and a large number of NGOs etc. are in place with an extensive Institutional support and are active in dissemination of information at grass root level. Introduction of a new Scheme "Private Extension Service Provider" will compliment the quality extension support to the farmers.

#### **IV.(d). *Processing and Value addition***

As recommended by the International Pepper Community (IPC), generic promotion of pepper is essential for improving the export of pepper. Nearly 90% of pepper produced in the world is marketed as black pepper. Recently there is awareness for value addition of pepper. The various value-added forms of pepper are as follows (refer Annexure 1 for details).



The agro-climatic condition and availability of required technology and quality raw material in abundance call for establishing processing and value addition units for internal & export market. There is good scope for production of white pepper and pepper in brine as the raw materials required are available at cheaper rate and spread over a period of six months in a year. The infrastructure required for the above are minimal and could be established at the production area itself. The financial assistance for establishing these units is available from District Industries Corporation and Dept. of Agriculture. Spices Board is providing technology and technical assistance for establishing such units.

#### **IV.(e). *Market infrastructure***

The private traders and number of intermediaries are the main market operators within Wayanad district. These produces are then transported to Kochi from where Pepper is exported after necessary export processing. International trading of pepper, Commodity exchange (IPSTA), Future trading etc are based at Kochi. Facilities are available with the Spices Board, Kochi in matters related to marketing and export of pepper. A Pepper post harvest processing unit established in Mananthavady, by WSSS, Mananthavady with the financial & technical assistance from Spices Board will cater to the need of exclusive processing of organic pepper. This unit is fully certified organic by IMO, Switzerland. The machinery/ facilities available with WSSS are

- ◆ Destoning/ cleaning unit
- ◆ Pepper Grading unit
- ◆ White pepper production unit
- ◆ Laboratory for analysis of pepper

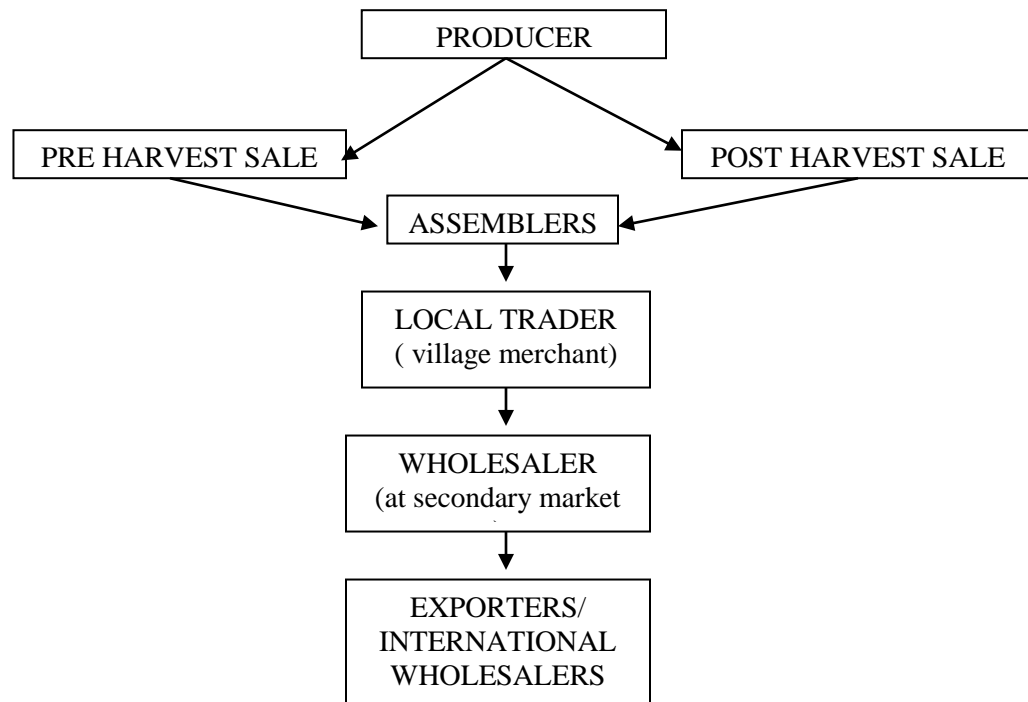
For storage of pepper, quality-warehousing facility is inevitable and is not available in Wayanad. **Therefore weather-controlled warehouses** need to be constructed to cater the international requirement for quality Pepper and the same will also facilitate the farmers to avoid distress sale by availing pledge loan facility and hedging facility with National Commodity Exchange.

#### **IV.(f). *Certification and testing***

Facilities are available in the Quality Upgradation Laboratory, Spices Board, an ISO 14001 accredited laboratory for spices at Kochi for processed pepper meant for export. Similar facilities are also available with IISR, Kozhikode.

## V. Marketing channel:

V.(a). *Within the country:* In India pepper is traded in the following pattern



When compared to other agricultural crops, marketing cost of pepper is very low (6.74%) and the farmer realizes nearly 87.7% of the consumer price. Pepper is considered as ‘black gold’ which can be stored ideally for long period and has sufficient liquidity when need arises. When the prices rule high, farmers tend to convert black gold to cash .If the prices fall, they will store it. Because of this, India tends to be the leading exporter of pepper during the years when the prices are high. When the prices are low, India becomes the smallest of the exporters of pepper.

## VI. Export Status

## VI.(a). Export

In the recent years Indian export of pepper has declined from 47000MT in 1996-97 to 25000MT in 2002-03. This is mainly due to the pepper exported by Vietnam at a cheaper rate. Pepper is exported in the following grades Malabar Garbled 1 (MG1) and Tellicherry Garbled Superior Extra Bold (TGSEB). Both the grades are the products of Kerala. Except India all other pepper producing countries export more than 80 % of their produce whereas share of export from India ranges from 30 – 40%

Table. 5. Export of pepper from India

Year	Quantity (MT)	Value (Rs Lakhs)	Unit value (Rs/kg)
2002- 2003	20000	16,610	83.05
2001- 2002	24000	21,192	88.30
2000- 2001	19250	32,632	169.50
1999- 2000	42803	88,482	206.72
1998- 1999	35109	63,479	180.80
1997- 1998	35582	49,489	139.08

Table. 6. Domestic price of pepper (Rs/kg)

GRADES	This month	Last year
MG1	80-86	105-108
TGSEB	92-93	118-120
POWDER	80-90	110-120

Table. 7. Price of white pepper (Rs/kg)

Country	Price in Rs
Indonesia	112
Malaysia	110
China	102
Brazil	142

Table. 8. Export rate of pepper (Rs/kg)

GRADE	RATE Rs/kg	Importing country
TGSEB	132	USA
White pepper (Muntok)	152	USA
Sarawak	128	Japan
MG1	85	Japan

Table. 9. Importing countries black pepper (1999-2000) (Quantity in MT, Value in 1000 \$US)

Country	Quantity	Value	Unit value (Rs/Kg)
USA	54381	265996	225
UK	4173	22198	230
Japan	6976	38840	258
Germany	18953	99297	239
France	7510	37321	230
Saudi Arabia	1936	3120	74
Jordan	223	573	119
Egypt	2911	10076	148



### **VI.(b). Targeted countries**

Pepper is mainly exported to the USA, European Union and number countries in the Middle East. Export of pepper may be targeted to countries like USA, Germany, France, Middle East countries (where Non resident Indian lives). There is very good potential for exporting branded Pepper from Wayanad, which has got inherent unique geographical indicative characters. The strength of Wyanad in the area of Organic Pepper production can also be exploited to a large extend for export, especially to EU Countries where there is an increasing demand for Certified Organic produce. Sri Parameswaran, Thirunelly, is a pioneer in branding and exporting of Black Pepper, white pepper and other pepper products of Wayanad to a number of European countries.

### **VI.(c). Organic pepper**

International Trade Centre, Geneva has forecasted 20 – 40% growth rate annually for organic spices. The demand for certified organic foods is increasing in the developed countries. Demand for organic pepper European countries is as follows.

Table. 10. Organic pepper requirement 2002 (Quantity in MT)

<b>COUNTRY</b>	<b>BLACK PEPPER</b>	<b>WHITE PEPPER</b>
Germany	120	20
France	25	4
UK	35	5
Netherlands	10	3
<b>TOTAL</b>	<b>190</b>	<b>32</b>

Of this India's contribution is 70 MT organic black pepper and 10 MT of organic white pepper. In the European countries alone, annual demand for pepper is 37,261 MT and if the anticipated requirement of organic Pepper is taken as 1.75 %, which amounts to 652 MT of certified organic pepper per annum. Hence there is very good scope for promoting export oriented organic pepper production. In Wayanad a movement has already been initiated by various agencies like WSSS, Mananthavady, HICOS, Pulppally, Brahmagiri Dev. Soceity etc for promoting organic cultivation of Pepper by organising farmers in groups.

### **VII. Value Addition**

There is good demand for the value-added products of pepper like White pepper and pepper in brine. Establishment of such units at village level can also be considered.

### **VII.(a). White pepper**

The production cost for white pepper from 100kg green pepper is Rs. 360 and the returns is Rs. 3,360 where us the production cost for black pepper from 100kg green pepper is 210 and the returns is 2640 so they net profit is Rs. 570. Infrastructure required for

establishing the white pepper production is minimal and the technical details is available with spices board.

Table. 11. Budget for production of black and white pepper

<b>COST ITEMS</b>	<b>BLACKPEPPER (Rs )</b>	<b>White pepper (Rs)</b>
Harvesting of spike	120	120
Separating berries(threshing)	30	120
Soaking in water (7 days)- removing skin	60	30
Drying, cleaning and packing	30	30
	<b>210</b>	<b>360</b>
<b>Total</b>		
Sale proceeds	2640 (Rs 80/ kg)	3360 (@ Rs 120/ kg)
Returns	2430	3000
		<b>570</b>
<b>Net returns</b>	(Recovery 33.3%)	(Recovery 28%)

## VII.(b). *Pepper in brine*

For production of pepper in brine, the spike should be 4-5 months old so that the peppercorns are fleshy without hard shell. The cost of production of pepper in brine from 20-kg fresh pepper is Rs. 2,878 and the returns Rs. 3,355 so there is a profit of Rs. 713. Pepper in brine unit also could be established near the field itself. NGOs or women's Self Help Group could be entrusted for producing pepper in brine and white pepper production units.

Table. 12. Production budget for making pepper in brine

<b>COST ITEMS</b>	<b>COSTS</b>	
	<b>Amount (Rs )</b>	<b>% of total</b>
Harvesting spikes	120	
Raw materials @Rs 20/kg	2000	
Cost of 12% brine solution (200 litres)		
Cost of additives (0.6 Citric acid)	120	
Cost of bottles (200 nos)	60	
Labour cost (2 man days)	500	
Miscel. Expenditure & Marketing	120	
	75	
<b>Total cost</b>	<b>2875</b>	93.21
Material cost	2680	4.17
Labour cost	120	2.61
Miscellaneous	75	100
Total		
Sale @ Rs 34/kg	3355	<b>21.31</b>
<b>Net returns over black pepper</b>	<b>715</b>	

## VIII. Production

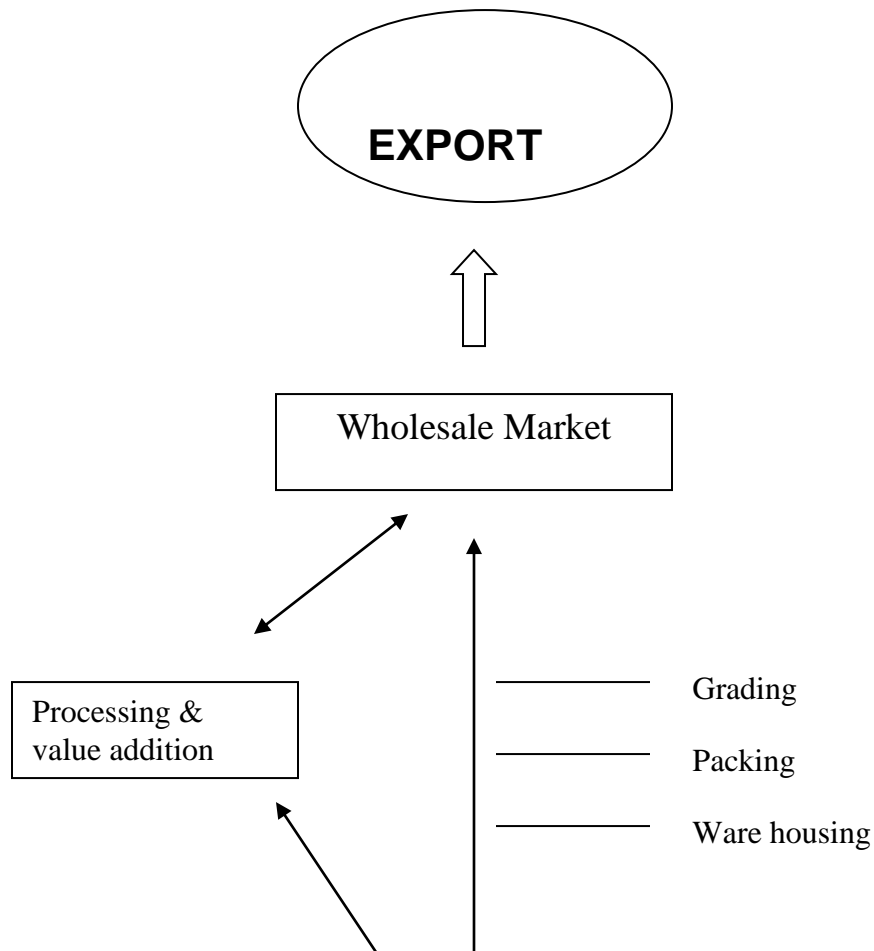
**VIII.(a). Area of cultivation**

It is proposed cover an area of **500** ha under agriculture export zone for pepper. The following villages are identified

1. Pulpally area.
  - (e) Kenichira – 50 ha.
  - (f) Mullankolly – 50 ha.
  - (g) Marappanmoola – 140 ha. (Organic spice village)
2. Vaduvanchal – 60 ha.- for bold pepper
3. Other areas – 200 ha

**VIII.(b). Organisational setup**

Proposed Organisational set up



Primary level -

farmers having 0.4 ha. or more (ideally)  
(Willing to adopt organic cultivation  
practice as per the certification requirement.  
Should follow **Good Agricultural Practice**  
committed to the overall objective)

**Organise & monitored by Spices Board,  
Krishibhavan Research Institutes &  
NGOs**

Cluster -  
ha.

25 to 30 farmers with a total area around 50

(Organised in to a formal set up with an  
approved bye laws and procedures)

**NGOs, Spices Board &  
Krishibhavans**

Assembling / Collection centre -

Minimum 5 cluster with total area of 250 ha.  
(Should have the required landed property to  
handle 100 MT of Pepper with modern

Infrastructure including semi processing and storage.)

***A management committee - members selected from groups, Local body & nominated from department and spices board***

Processing centre

10 collection centres with a total area of 2500 ha for one year will cater a processing centre.

(Can be attached to the Wholesale market and should have the facility for processing pepper as per international quality standards. Should also acquire appropriate technology for value addition, processing and packaging

***Private entrepreneurs, Co-operative institutions Government body etc with assistance from financial institutions and governmental agencies***

Marketing centre

One wholesale market with all facilities for export processing including production of sterilised Pepper with advanced system for grading sorting and packing leading to ultimate export. Should also have weather-controlled warehouse, modern lab facilities for sanitary and phyto-sanitary testing.

***To be established at Agricultural Wholesale Market, Bathery managed in association with Market Authority and Private players***

Market Information centre

A market information dissemination centre should be set up in Agricultural Wholesale

Market, Bathery and processed information have to be provided to all project units and farmers.

***Managed by AEZ cell and Marketing Directorate, GOK in association with NGOs and other willing institutions***

**VIII.(c). Awareness & training**

Extensive training to the farmers, labours will be given on all aspects related to pepper production, marketing and export. A core committee comprising of all the extension staff of various Agri Research Institutions and willing NGOs will be formed in the district to co-ordinate the training activity.

**VIII.(d). Input mobilization**

**Planting material** – a) Tissue cultural Lab – 1 no.  
 b) Hardening unit - 2 to 3 Nos  
 c) Nursery – 1 Centralised and 3 Decentralised nurseries

**Organic inputs** 1) Bio fertilizer units (production / training & distribution)  
 2) Bio pesticide / fungicide Unit (production / training & distribution)

Inputs required for all the cultural operation will be made available in consultation IISR, Kozikode.

**IX. Quality Assurance**

**IX.(a). Quality standards**

In order to export spices the quality specification issued by, American Spice Trade Association (ASTA) will be adopted as it is widely accepted by the world.

International contract specification for pepper is as follows.

General microbiological specification for spices adopted European Countries.

Table. 13. Specification for malabar garbled pepper

Grade	Extraneous matter not exceeding	Light berries not exceeding%	Moisture content %	General
MG Grade 1	0.5	2.0	11	Dark black globular
MG Grade 2	0.5	5.0	11	

				<b>Piper nigrum</b> Specific gravity 0.80 – 0.82
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Table. 14. Specification for tellichery garbled pepper

Grade	Size dia of the sieve to be retained	Extraneous matter not exceeding	Light berries not exceeding%	Moisture content %	General
TGSEB(Tellichery Garbled superior Extra Bold)	4.75	0.5	3.0	11	Dark black globular <b>Piper nigrum</b> Specific gravity 0.80 – 0.82
TGSEB(Tellichery Garbled Extra Bold)	4.25	0.5	3.0	11	
TGSEB (Tellichery Garbled Bold)	4.25	0.5	3.0	11	

Table. 15. International quality specification

Type of pepper	Black pepper
Moisture	Upto 12% by weight
Light berries	Upto 2% by weight
Mould visible to naked eye	Upto 1% by weight
Extraneous matter	Upto 1% by weight
Mammalian excreta	Upto 1mg per 440 g ( 1 pound)
Other excreta	Upto 5mg per 440 g
Insects	2 per 440 g

### IX.(b). *Post harvest handling*

De corning of Pepper –	Using small mechanised de corning machine
Blanching –	In hot water
Drying -	Sun drying using hygienic materials / Dryer
Garbling -	Automatic garbling units
Grading -	Mechanical Graders attached to garbling units
Sterilising	Unit attached to the garbling facility for steam washing and microwave oven drying
Packing -	Automatic bagging attached to the grading unit
Storage -	Weather controlled warehouse

### IX.(c). *Packaging norms*

Indian Institute of packaging, Mumbai, the authority on packaging will be followed on packaging for export as per the norms prescribed by different importing countries.

## **X. Value addition & Processing**

(see annexure)

All technical details are available from Spices Board on value addition of spices.

## **XI. Marketing**

The pepper is marketed either in open market or through commodity exchanges for which the pepper will be pooled at the modern warehouse at Agricultural Wholesale Market, Bathery. It is also possible to have advance contract with exporters / countries as in the case of contract farming system. Group marketing possibilities can be explored for mobilising the produce to a marketable lot for effective negotiation.

## **XII. Infrastructure Development**

### **XII.(a). Production**

Tissue culture Lab, Hardening Unit, Nurseries  
Training centre for organic management  
Production units for Bio fertilizer, Bio pesticides etc.  
Certification for Organic & GAP  
Developing procedures, packages for organic cultivation & documentation  
Advanced soil testing including micro nutrient analysis and leaf analysis

### **XII.(b). Quality assurance**

Sanitary and Phyto – sanitary testing facility  
Residual Toxicity testing facility  
Agmark lab for grading

### **XII.(c). Value addition**

Technology dissemination centre for value addition  
An industrial estate for producing following value added products  
(White Pepper, Green Pepper, Pepper Oleoresins, Pepper oil etc.)

### **XII.(d). Marketing**

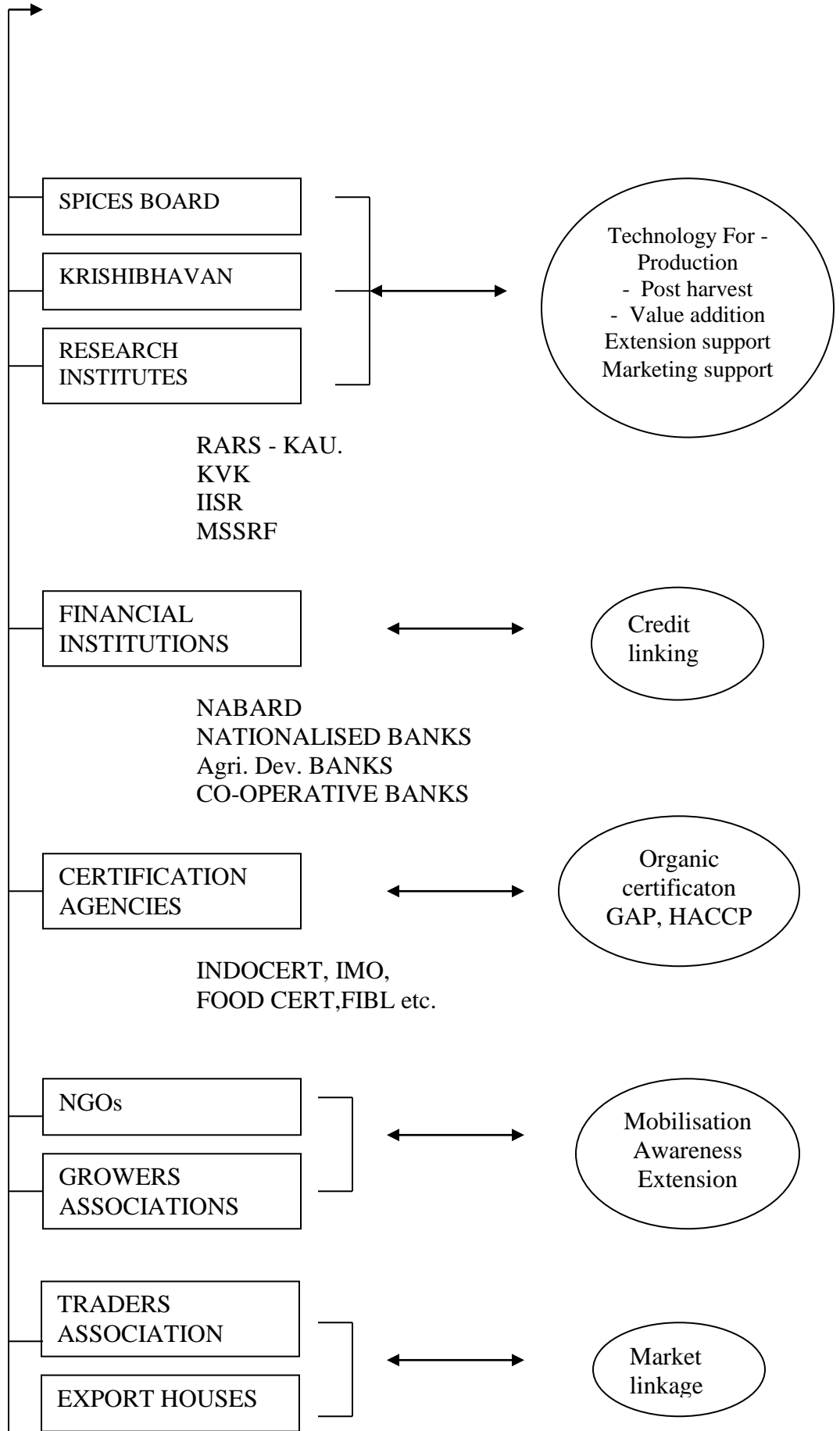
1000 MT capacity weather controlled warehouses – 3 nos located in three Blocks  
Sterilised Pepper production Unit with Garbling & Grading facility  
Market Information dissemination system  
Market finance

### **XII.(e). Institutional Support**

Proposed Institutional Network for effective Management of AEZ Pepper

Agri Export Zone - Pepper NODAL AGENCY A.E.Z . CELL
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Following Institutions can play vital role in AEZ for pepper

SPICES BOARD	Certification, Technology & Infrastructure
AGRI. DEPARTMENT	Planting material, Input subsidy, extension
Ministry of Agri /DMI	Warehousing subsidy, Market Information
D.I.C	Capital subsidy for Industrial unit
IISR	Technology for value addition & Production
CFTRI / DFRL	Processing & Value addition technology
NABARD	Credit facilitation through banks for the above

### **XIII. Conclusion**

- Pepper is one of the main commercial crops cultivated in most of the area in Wyanad District.
- Area under cultivation is 40200 Ha with production of 18200 MT
- The pepper produced in this part is superior in quality because of its intrinsic qualities. Hence, there is good export market for Wyanad pepper.
- Pepper is mainly marketed as Black pepper, there is good market in the USA and Europe for value added pepper such as white pepper and pepper in brine
- Processing of the above is very easy and doesnot require huge infrastructure. Self Help groups or Women s groups in the identified AEZ may be assigned for the production.
- Similarly there is good demand for the organic pepper in the developed countries. HICOS, Marapanmoola , Pulpally and WSSS, Manathavady are engaged in the production of certified organic pepper with the assistance form the Spices Board. Farmers in these areas and other interested farmers may be identified for production. Pepper processing facilities available in WSSS, Dwaraka could be utilized for export of pepper .
- Technical assistance on production can be had from IISR, Kozhikode and for marketing and export from Spices Board , Kochi.
- AEZ – Pepper could be carried out in the following places covering an area of 300 Ha with production of 450 MT.

## **IV (b). VANILLA**

### **I. Introduction**

Vanilla (*Vanilla planifolia*), the second costliest spice after Saffron is in great demand world over in the recent years, The source of flavour is the aromatic essence , Vanillin, which crystallizes outside the pod after series of curing and drying processes. Vanilla is usually marketed as an alcoholic extract for use as food flavouring and perfumery. Vanilla is Indigenous to Mexico. The major Vanilla producing countries are Madagascar, Indonesia, Cameroon and Reunion Islands. As Vanilla is an orchidaceous plant it grows well in organic environment. Vanilla produced organically is preferred by consumers.

### **II. Statistics**

Area under Vanilla cultivation during 1999 is 37525 Ha with production of 4403 MT. Madagascar and Indonesia contribute 40% each of world production. Aggregate global demand for Vanilla is estimated at about 2000- 3000MT per annum. The USA, France and Germany account for nearly 80% of the Vanilla trade. The USA imports 50- 60% and France and Germany account for 15% each of Vanilla trade. In 1998, out of the world import of 3972 MT the USA imported 941MT. The price level prevailing in the USA can be considered as the basis for all international trade transactions. The price of Vanilla has fluctuated from year to year. During 1992 the price is US\$ 52 per kg and during 1998 it was US\$19.

In the recent years demand for natural Vanilla has soared considerably ,the current price for the 1st grade bean (good flavour, more than 14cm moisture content about 25%)is US\$ 200 – 240 per kg( Rs 10500- 11500 per kg).

### **III. Natural versus SYNTHETIC vanilla**

One of the main flavouring compounds in vanilla bean is Vanillin. The Vanilla beans have a delicate aroma, rich and mellow with pleasant after taste. But synthetic Vanilla has a heavy and grassy odour with less agreeable aftertaste. Synthetic Vanillin is used in most of the countries (developed countries also) because of its low price (Rs 441/kg). Synthetic Vanillin is produced from Clove oil, Eugenol, waste sulphate liquor or coal tar waste. World production of synthetic Vanillin during 1988 was 12000 MT and 16000MT during 1992with growth rate of 7.5%. The current world requirement is estimated to be 28000MT.

The Vanillin content of processed bean ranges from 2- 4%. About 3000MT of natural Vanilla is traded world over. The natural Vanillin is about 50MT or 0.32%of the total synthetic vanillin produced (based on 1988production). If at least 1% of the demand of the synthetic vanillin is replaced with Vanilla beans about 14000MT of natural Vanilla beans are required by the end of 2010. In order to produce the above quantity 46666 ha

has to be under cultivation. There is scope for Vanilla cultivation in India. Spices Board has envisaged for cultivation of vanilla in 5000 ha by the end of the plan period.

#### **IV. Vanilla in India**

In India Vanilla was introduced by the British about 200 years back. In Kerala Vanilla was introduced in Ambalavayal Farm. In 1960 commercial cultivation of Vanilla was started in Mangala Carp Estate in Wyanad. A number of farmers have taken up Vanilla cultivation in Wyanad about 30 years back. Considering the export potential of Vanilla in the international market Spices Board has initiated cultivation in the early 1990s in the Kerala, Karnataka and Tamil Nadu. A number of growers associations are formed to promote/ facilitate cultivation and marketing. During 1999- 2000 Vanilla was cultivated in 1000 ha with production of 6 – 8 MT of processed beans. During 2001- 2002, 65 MT of processed beans were produced. In Karnataka 1081 ha is under cultivation, by the end of 2005 the area is expected to increase to 2500 ha.

In 1998, India imported 188MT of synthetic vanilla. As vanilla is consumed mainly by the upper and middle class youth. There is very good demand for natural products. If 10 % of synthetic Vanillin is substituted with natural vanilla about 935 MT of natural Vanilla is required in India (Vanillin content is 2% in Vanilla beans). About 3100 ha has to be under Vanilla cultivation to meet the above demand.

India is the leading producer of spice oils and oleoresins, about 3- 5 MT of processed Vanilla is imported. If good quality processed vanilla is supplied to the industry foreign exchange could be saved.

In Wyanad area under Vanilla is 120 ha with production of 4 .0 MT of fresh beans. In most of the fields Vanilla is cultivated organically. The production is very low as most of the fields are young and will be able to bear full crop in 2 – 3 years.

#### **V. Economics**

Under proper management Vanilla will start bearing 3 years after planting. The yield will stabilize from 6<sup>th</sup> onwards to 15<sup>th</sup> year. The cost of cultivation for Ha (1600 vines/Ha) is Rs 50,000/- (Rs 29200, Rs 9600/- and Rs 11200/- for 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> year respectively). Total cost of cultivation for 15 years is Rs 2.3 lakh per Ha. .Expected production of processed bean is 3210kg per ha for 15 years@ 300 kg from 6<sup>th</sup> year onwards. The total income is expected to be Rs 12.84Lakh @ Rs 400/ kg processed bean.

#### **VI. Constrains**

As Vanilla is spreading in most of the southern states availability of quality planting material is scarce. Spices Board has initiated programme for supply of Vanilla tissue

cultured plants and vanilla rooted cuttings. Hardened tissue cultured plants are available @Rs 6 per plant and Rs 12.50 for rooted plants. The market price for 1 meter length vine ranges from Rs 25 – 35.

Vanilla comes to yield three years after planting. In Vanilla self pollination is not possible due to the presence of rostellum obstructing the anther (pollinia) and the stigma. Hand pollination is to be carried out with a pointed bamboo splinter or sharp toothpick. The rostellum is pushed backwards, overhanging pollinia is pressed against the stigma. This is done efficiently by adolescents. A skilled worker can pollinate 1500- 2000 flowers in a day.

Vanilla beans are processed by new Bourbon method . This method involves 4 stages-

- Killing the beans at 63-65<sup>0</sup>Cfor 2 minutes to onset enzymatic activity
- Sweating
- Slow drying – for development of different fragrant substances
- Conditioning- storing the product for a few months

Spices Board has expertise in the processing aspects of Vanilla. Technical and financial assistance from the Spices Board can be had from Spices Board.

A number of farmers in Wayanad are processing Vanilla and get good price for their produce.

Processed Vanilla is graded in five types based on the length, aroma, colour, moisture content, consistency and free from blemishes

- 1<sup>st</sup> grade- good flavour, length greater than 14cm, supple, full, no spots or scratches, uniform tannish brown in colour and moisture content less than 25%
- 2<sup>nd</sup> grade- - good flavour, length greater than 14cm, supple, some spots and scratches, and moisture content between 25- 28 %
- 3<sup>rd</sup> grade- good flavour, length greater than 14cm, supple or dry spots and scratches, red blemishes and moisture content more than 30 %
- 4<sup>th</sup> grade- Broken or cut , length less than 14 cm , red blemishes, moisture content more than 30%
- all other beans.

## **VII. Area of cultivation (Wayanad)**

Though Vanilla cultivation is spread allover Wayanad ,it mostly concentrated around Kalpetta, Muttill, Sulthan Bathery and Nadavayal areas. Existing Vanilla fields in the above areas may be identified and selected for the programme. About 50 ha may be brought under AEZ for Vanilla.

## **VIII. Conclusion**

Vanilla cultivation in India (especially in the Southern states ) is progressing at a faster rate.

In Wyanad there are a number of farmers cultivating Vanilla organically. They process the beans and sell to the prospective buyers.

About 50 Ha could be identified in the existing Vanilla fields (Kalpetta, Muttill, Nadavayal, and Sulthan Bathery) and brought under export zone.

Technical assistance in aspects related to cultivation, processing and marketing can be had from Spices Board.



## **Coffee**

*M.P. Sanath Kumar, Dr. Selvakumar, P. A. Rahiman,  
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## **Chapter V**

*COFFEE*

## Summary

Coffee is a tropical evergreen shrub and dried beans of which are roasted, ground and brewed to make stimulating and refreshing beverage. Presently coffee is one of the important beverages in the Western World. Coffee is internationally traded commodity next only to petroleum products. India is one of the important countries producing and exporting coffee. Karnataka and Kerala are the main coffee producing states in India. Kerala is one of the traditional coffee growing states and occupies the second position in the country after Karnataka. Out of the total area in Kerala, more than 80% is in Wayanad.

Robusta is the main variety which is cultivating in Wayanad. Quality of well processed Robusta coffee is found to be good. The quality of Wayanadan Robusta is appreciated in the world market for its neutral cup quality. This variety is generally used as a blend in the brew with Arabica coffee and for producing value added products.

Coffee in Wayanad occupies nearly 58% of the total agricultural area. More than 60% of the coffee growers are small holders with less than 1.0 ha. The socio-economic development of small holders depends upon the profit out of coffee cultivation. The international price of Robusta coffee shows a fluctuating trend. The dumping policies of certain coffee producing countries also affecting the prosperity of Indian coffee.

Proper marketing strategies, especially selling after Monsoon period, modernization of production and value addition are inevitable to catch international demand for Indian coffee. Agri. Export Zone, in this context will be an inspiration to the coffee producers and the agricultural economy of Wayanad District.

## 1. Introduction

Coffee is a tropical evergreen shrub and dried beans (seeds) of which are roasted, ground and brewed to make stimulating and refreshing beverage. This use was first discovered in Arabia around the middle of the 15th century. Presently coffee is the most important beverage in the western world.

Kaffa province in Ethiopia is the home of arabica coffee and central Africa is the home of robusta coffee. Presently coffee is cultivated in more than 80 countries and the global production is around 66.30 lakh tones. Brazil dominates with  $\frac{1}{3}$  of total world production. Columbia and Vietnam are the other major produces of coffee.

Kerala is one of the traditional coffee growing states and occupies the second position in the country after Karnataka. Out of the total coffee area in Kerala, more than 80% is in Wayanad District.



Arabica and Robusta are the two main varieties of coffee cultivated in India. Arabica coffee was introduced to India during 1600 AD by a Muslim pilgrim Baba Budan. Coffee was introduced to Kerala by British planters and was planted in Mananthavady. Later its cultivation was extended to other parts of the district. Severe leaf rust disease and incidence of white stem borer caused the decline of the cultivation of arabica coffee. This led to the introduction of robusta coffee from Java, during 1900 by Wayanad planters.

## II. Coffee production in the world

Coffee is cultivated in 80 countries of which Brazil is the largest coffee producer in the world. Colombia, Vietnam, Mexico, Cote d’ivoire, Mexico and India are other important countries producing coffee.

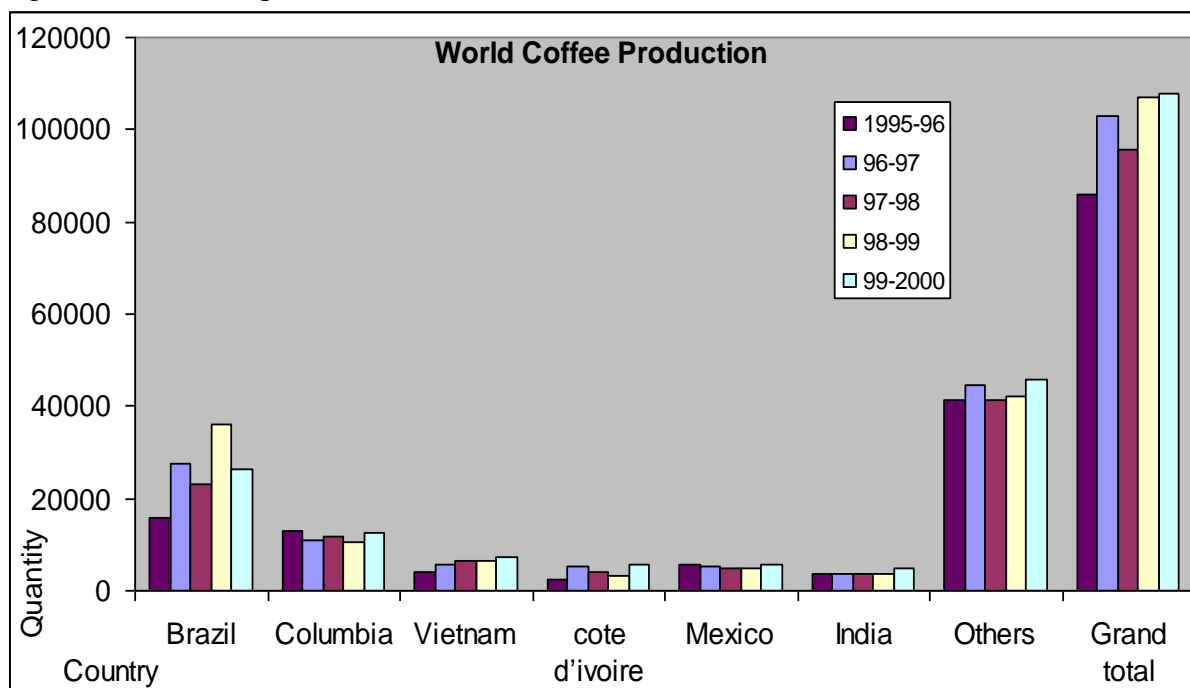
Table 1. World coffee production, ‘000 60 kg bags

Country	1995-96	96-97	97-98	98-99	99-2000
Brazil	15753	27585	23000	36000	26500
Columbia	12878	10873	11900	10500	12500
Vietnam	3938	5705	6666	6500	7166
cote d’ivoire	2532	5333	4133	3166	5500
Mexico	5527	5374	4800	4800	5500
India	3727	3469	3800	3835	4750
Others	41515	44525	41398	42081	45897
<b>Grand total</b>	<b>85870</b>	<b>102864</b>	<b>95697</b>	<b>106882</b>	<b>107813</b>

Source: <http://www.commodityexpert.com>

Source: ICO, ACPC, USDA, coffee trade organisations, producers, and commodity expert estimates.

Fig.1. World coffee production, selected countries



### III. World trade in Coffee

Brazil tops the export trade of coffee followed by Colombia, Vietnam, Mexico and India. The following table indicates the volume of coffee export by the chief producing countries.

Table 2. Exportation in '000 60 Kg bags from major producing countries between 1995- 2000

Country	A / R	1995	1996	1997	1998	1999	2000
Brazil	A/R	15,784	27,664	22,756	34,547	32,353	31,100
Colombia	A	12878	10,876	12,211	11,088	9,336	12,000
Vietnam	R	3,938	5,705	6,915	6,947	11,264	11,350
Indonesia	R/A	5,865	8,299	7,759	8,463	6,014	7,300
Mexico	A	5,527	5,324	5,045	5,051	6,442	6,338
India	A/R	3,727	3,469	4,735	4,372	5,407	4,917
Guatemala	A/R	4,002	4,524	4,218	4,892	5,201	4,500
Cote d'Ivoire	R	2,532	4,528	3,682	2,042	5,463	4,167
Uganda	R/A	3,244	4,297	2,552	3,298	3,097	3,200
Others		28150	27809	26097	25808	29641	28029
<b>Grand total</b>		<b>85647</b>	<b>102495</b>	<b>95970</b>	<b>106508</b>	<b>114218</b>	<b>112901</b>

Source: ICO, ACPC, USDA, coffee trade organisations, producers, commodity expert estimates

A- Arabica

R- Robusta

Fig. 2. Contribution of India and Brazil in world coffee trade

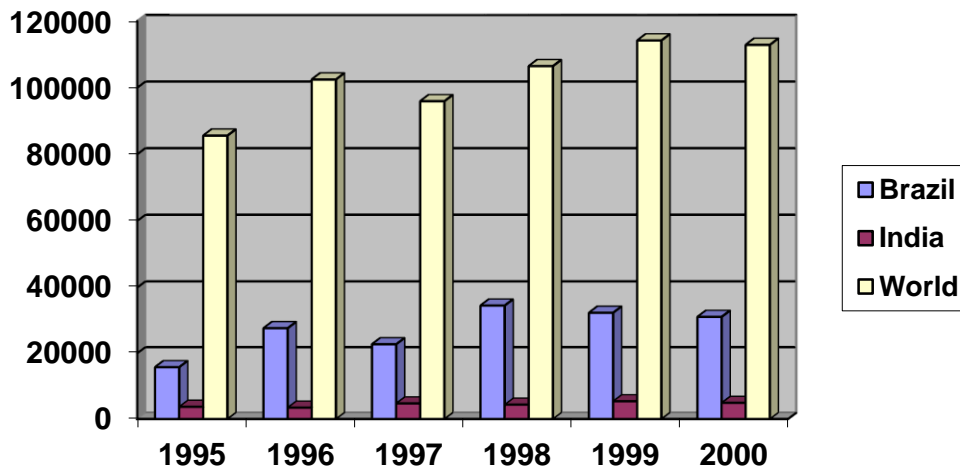


Table. 3. A detailed analysis of export performances of India and Brazil

Year	Brazil			India			World	
	Qty	% in world trade	% growth	Qty	% in world trade	% growth	Qty	% growth
1995	15784	18.43		3727	4.35		85647	

1996	27664	26.99	42.94	3469	3.38	-7.44	102495	16.44
1997	22756	23.71	-21.57	4735	4.93	26.74	95970	-6.37
1998	34547	32.44	34.13	4372	4.10	-8.30	106508	9.89
1999	32353	28.33	-6.78	5407	4.73	19.14	114218	6.75
2000	31100	27.55	-4.03	4917	4.36	-9.97	112901	-1.15

(export in '000 60 Kg bags)

India's contribution in the world coffee trade shows stagnation while there is a quantum jump in the quantity of coffee exported by Brazil. Brazil occupied 18.43 % share in the world coffee trade during 1995 with a total quantity of 15784000 bags which increased to 27.55 % and 31100000 bags in 2000, ie around 49.25% increase over a period of five years. The corresponding figure for India was 4.35 % with a total quantity of 3727000 bags for the year 1995 which increased to just 4.36 % and 4917000 bags, ie around 24.20 % increase over a period of five years. The trend also shows the fact that, whenever there is a decline in the growth rate of coffee export from Brazil, the same for India is showing upward trend during the corresponding year. This reveals the truth that India faces severe threat from Brazil in exporting coffee.

#### IV. Prospects of Indian coffee

As per the latest data, India is the sixth largest exporter of Coffee. Export from Brazil has doubled during the period between 1995 and 2000. The export demand for Arabica coffee shows a stagnant position. The percentage of annual increase in export from India was not satisfactory compared to Brazil and Vietnam.

Table. 4. Coffee production in India

State / District	2002-03 post monsoon forecast		
	Arabica	Robusta	Total
<b>Karnatak</b>			
Chikamagalur	43,850	31,125	74,975
Coorg	23,950	68,625	92,575
Hassan	17,250	6,500	23,750
<b>Sub Total</b>	<b>85,050</b>	<b>106,250</b>	<b>191,300</b>
<b>Kerala</b>			
Wayanad	75	54,050	54,125
Travancore	650	7,650	8,300
Nelliampathies	450	1,550	2,000
<b>Sub total</b>	<b>1,175</b>	<b>63,250</b>	<b>64,425</b>
<b>Tamil Nadu</b>			
Pulneys	6,475	275	6,750
Nilgiris	1,350	2,800	4,150
Shevroys (Salem)	2,900	0	2,900
Anamalas	1,500	450	1,950
<b>Sub Total</b>	<b>12,225</b>	<b>3,525</b>	<b>15,750</b>
<b>Non Traditional areas</b>			
Andhra & Orissa	3,300	0	3,300
North Eastern region	175	125	300

<i>Sub Total</i>	<i>3475</i>	<i>125</i>	<i>3,600</i>
<i>Non Conventional areas</i>	<i>200</i>	<i>0</i>	<i>200</i>
<b>Grand total</b>	<b>102,125</b>	<b>173,150</b>	<b>275,275</b>

Kerala is the second largest producer of coffee next to Karnataka. Out of the total coffee area in Kerala, more than 80% is from Wayanad. Robusta coffee is the major variety, which is cultivated in more than 99% of the total area under coffee. The yield potential of robusta coffee in Wayanad is reported to be 1400 and 2500 Kg./ha. under rain fed and irrigated conditions respectively. Productivity of Wayanad is still less around 832 kg./ha. Quality of well-processed Wayanad robusta coffee is found to be good. Robusta is generally used as a blend in the brew with Arabica. Besides, there is a good demand for washed robustas in international market.

## V. Market for Indian Coffee

Coffee depends mainly on export market. Nearly 80% of the coffee produced in India is exported and remaining consumed in the domestic market. The following table shows the Exports of coffee from India by countries (provisional statistics 2002/2003)

Table. 5. countries importing coffee from India in 2002-2003

<b>Destination</b>	<b>Quantity (in MT)</b>	<b>% of total</b>	<b>Unit value Rs./Tonne</b>
Italy	12574	23.46	38874
Germany	8646	16.13	42607
Russia	5086	9.49	67410
Spain	3819	7.13	37429
Belgium	3783	5.23	41832
Slovenia	2800	3.05	34193
USA	1633	2.87	40312
Japan	1539	2.65	50494
Greece	1422	2.59	41266
Netharlands	1388	2.51	72220
France	1346	2.11	50460
Others	9557	17.83	
Total	53593	100	45606

Source: <http://www.indiacoffee.org/coffee/indiaexports.html>

Provisional (from 01. 04. 2002 to 30. 06. 2002)

Italy is the main importing country of Indian Coffee. However, the unit value / tonne is comparatively less. The other main importing countries are Germany, Russia, Spain, Belgium, Slovenia, U.S.A. and Japan. More than 42 countries are presently importing coffee from India. There is an urgent need to increase the quantum of export. By restructuring the total production process and by capturing demand for organic coffee, it is possible to double the export of coffee from Wayanad.

Indian Robusta coffee has got premium market advantage due to its inherent quality (see the box.1)

Box.1

**Quality Assessment of Robusta Coffee from Wayanad**

## VI. Potential of Wayanad District in Coffee cultivation

Wayanad has got ideal climate, soil, human resources and institutional support suitable for coffee cultivation.

Box.2 . SWOT analysis for Wayanad coffee

<i>SWOT ANALYSIS</i>		
<b>Strength</b>	<ol style="list-style-type: none"> <li>1. Uniform area (soil, topography, elevation, rainfalls, planting materials, cultivar etc)</li> <li>2. Biomass rich, favouring environment for coffee cultivation</li> <li>3. Mixed cropping pattern and reliance on more than one crop</li> <li>4. High and unique quality beans of Robusta coffee</li> <li>5. Large area, uniform quality and bulk quantity</li> <li>6. Rainfall for 10 months/year</li> <li>7. Fertile soil</li> </ol>	<b>Weakness</b>
<b>Opportunity</b>	<ol style="list-style-type: none"> <li>1. Increasing demand for robusta</li> <li>2. High demand for organic coffee</li> <li>3. Premium price for Indian coffee</li> <li>4. Product diversification (shaded coffee, sun dried coffee, monsooned coffee etc)</li> <li>5. Gulf countries</li> <li>6. Favourable entry time for the Indian coffee in the international market</li> </ol>	<b>Threat</b>
	<ol style="list-style-type: none"> <li>1. Low average holding</li> <li>2. Poor productivity</li> <li>3. Lack of infrastructural facilities like weather controlled warehouses, standard drying yards etc</li> <li>4. Lack of information on markets</li> <li>5. Lack of micro uniformity</li> <li>6. Poor phyto-sanitation</li> <li>7. Climate fluctuation</li> <li>8. Increased production cost</li> </ol>	

## VII. International price movement of robusta coffee

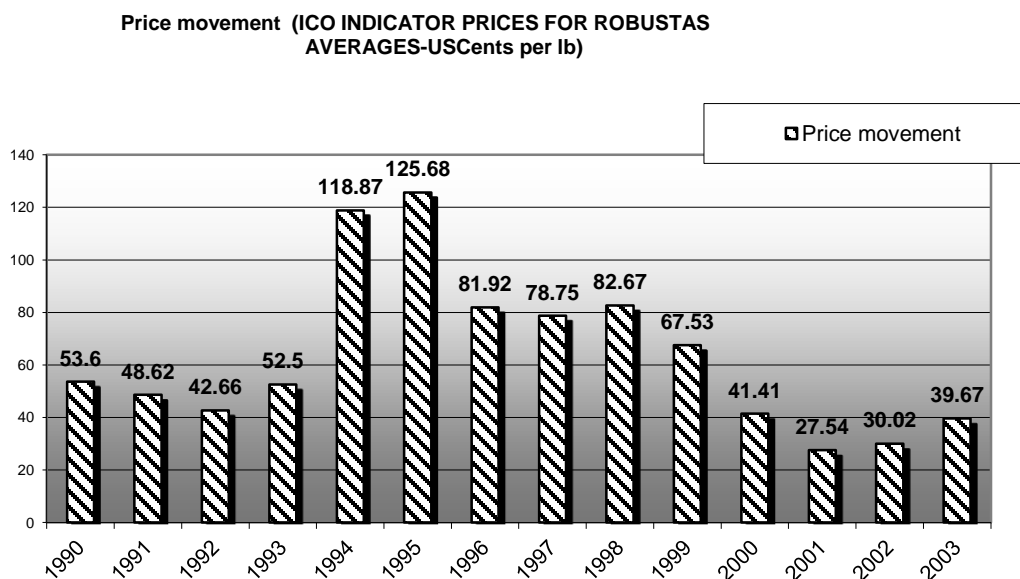
The price of robusta coffee in the international market shows a fluctuating trend. The highest price recorded in the year 1995 as 125.68 US Cents per lb, which was just 27.54 in the year 2001

Table. 6. ICO indicator prices for robustas averages- US Cents per lb

Year	Price	Year	Price
1990	53.6	1997	78.75
1991	48.62	1998	82.67
1992	42.66	1999	67.53
1993	52.5	2000	41.41
1994	118.87	2001	27.54
1995	125.68	2002	30.02
1996	81.92	2003	39.67

(Figures pertaining to the year 2003 is provisional)

Fig. 3. Price movement in international market



## VIII. The domestic market for coffee

The internal market for coffee is also to be tapped properly. The domestic market trend shows stagnation in the consumption of coffee in India. Measures must be taken to increase the consumption in India by diversification and value addition. The following table indicates the domestic market trend.

Table. 7. *Coffee consumption in India*

(Estimated domestic consumption 1991 – 2000)

Calendar year	Quantity (in MT)

1991	55000
1992	55000
1993	50000
1994	50000
1995	50000
1996	50000
1997	50000
1998	50000
1999	55000
2000	58000

Source: <http://www.indiacoffee.org/coffee/indiaexports.html>

## IX. Socio-economic importance of Coffee Cultivation

Coffee in Wayanad (66,999 ha) shares 33.65 per cent of the total cropped area in the district. Coffee is grown both as pure crop and as mixed crop along with pepper. Most of the coffee farmers are small growers who depend chiefly on coffee cultivation for their livelihood. The table below shows the average holding of coffee plantation in the state.

Table. 8. Average size of holding in India and Kerala

<b>Small holding</b>	<b>India</b>	<b>Kerala</b>	<b>%</b>
Below 2 ha	117098	64272	54.90
Between 2 and 4 ha	26799	10337	38.60
Between 4 and 10 ha	10314	2338	22.67
Total small holding	154211	76997	49.93
Large holding	2600	307	11.08

Source: Coffee board

Most of the coffee growers are small holders. The socio-economic development of the small growers depends upon the production and profit from coffee. Similarly coffee generates about 100 labour days per acre per year. This fact reveals that improvement in the standard of living of both small holders and labour class is closely related to coffee cultivation. Value addition and possible employment opportunities will directly boost the agrarian economy of the district.

## X. Present marketing channel

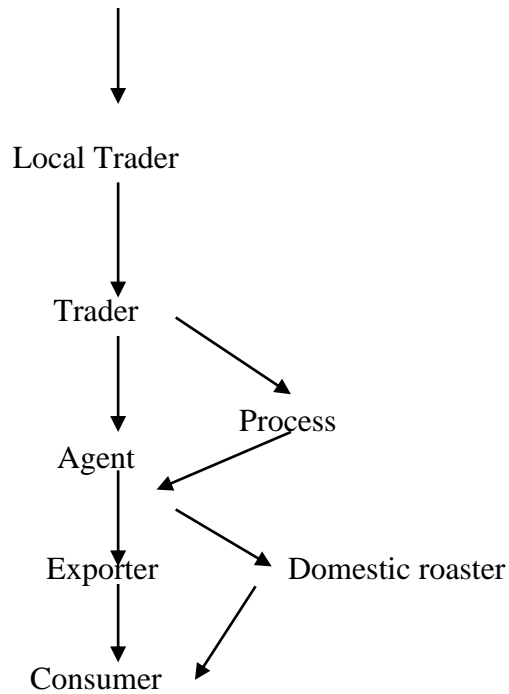
The present marketing channels reveal that there are lots of middlemen who exploit both the coffee producer and the consumer. Since, most of the cultivators are small holders and do not stock their product until the market offers a good price. Middlemen utilize this opportunity well and increase his stock as possible. The real gainers are the traders under the present marketing channel. Most important reasons are as follows:

- Lack of accessible warehouses including weather controlled warehouses
- Lack of financial assistance on product under stock
- Lack of market information

- Lack of confidence among farmers in taking risks.

The present marketing channel is graphically represented below.

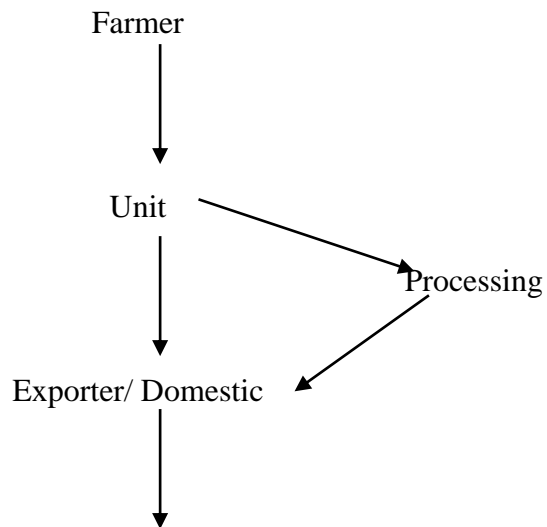
*Farmer*



### **XI. Proposed market channel**

The proposed market channel is farmer friendly and free from exploitation. The benefit of AEZ should be reached to the farmers. Accessible warehousing facilities, auction centres, marketing research wing for coffee etc are to be set up in the district. The proposed marketing channel should satisfy the value addition prospects also. (market information dissemination centre should be initiated)

Proposed market channel for coffee





Consumer

## **XII. Strategies to be adopted**

### **XII. (a). *Production front***

Productivity of coffee in Wayanad is below the national average. Strategies must be formed to increase the yield of coffee plants by adopting sustainable agricultural practices. Regional Coffee Research Station located at Kalpetta and Coffee Growers Association can play a vital role in this regard. Campaign for organic cultivation and certification are the possible methods for the production of quality coffee of international requirements.

Tissue Culture and other scientific labs may be set up for producing quality seedlings, for extending agro-clinical facilities to farmers and etc.

Insurance for crops, credit facilities, value addition trainings etc are the other important requirements.

Box .3

#### **Proposed production strategy**

A unit of 500 ha can be divided into 50 clusters. In each cluster, around 5 planters can be included.

Such units can practice a uniform cultural practices to ascertain uniformity of the product. Initially

### **XII. (b). *Quality Assurance***

- Standard drying yard
- Pulping units
- Storage facility
- Quality control lab

## **XII. (c). *Value addition***

Technical expertise and tie up with national and international agencies in this regard is inevitable. Coffee Board has an important role to disseminate the value addition techniques to the farming communities. In order to develop and facilitate technology transfer, we have to set up a technology dissemination institute under coffee board.

### **XII. (c).1. *Instant coffee***

International demand for instant coffee has been increasing day by day. Since Robusta being one of the ingredients of instant coffee, increased demand for instant coffee will automatically lead to increase in demand for robust coffee also.

### **XII. (c).2. *Washed robusta***

Washed robusta has also got good demand in the international market. This opportunity will be utilized by increased production of robusta coffee

### **XII. (c).3. *Monsooned coffee***

This is by treating ordinary coffee in particular climatic conditions, especially of salt wind. This has got demand in the international market and expecting good demand in the future also.

### **XII. (c).4. *Powder coffee in different ingredient combination***

Ginger coffee, Coffee mixed with osmium sanctum, etc are future possibilities.

### **XII. (c).5. *Specialty coffee***

Value added specialty coffee like 'Mysore nuggets' can be produced from Wayanad also

### **XII. (c).6. *Organic coffee***

Future trade prosperity depends up on organic coffee. Since Wayanad has a vast potential to convert into organic zone, we can boost the export of coffee in the international market

## **XII. (d). *Marketing***

- Free movement of coffee within the country
- Exemption from taxes for export
- Market information and forecast
- Promotion of coffee in domestic market
- Tie up with companies like Amul for marketing

**XII. (e). *Credit facilities for farmers in production and storage of products***

- Provision of credit facilities to growers through nationalized banks / Co-operative bank/NABARD or other financial institutions
- Common facility for drying, storage to be provided
- Transport facility, road and vehicles
- Subsidies granted for common facilities including lab

**XII. (f). *Proposed organizational set up for coffee production under AEZ***

Individual – cluster – unit-  
Group farming

The potential coffee areas listed by Regional Coffee Research Station, Chundale, will be selected for bulk production. In order to produce uniform quality coffee, certain restrictions are imposed on coffee production. The production is to be organized in different clusters consisting of about 500 hectares. A liaison officer will be in charge of coffee production under the selected clusters. Coffee Board will train the farmers to produce quality coffee.

**XII. (g). *Post harvest technology***

- Certification
- Quality inputs
- Quality lab

**XII. (h). *Post harvest handling***

- Gleanings should be separated /selective picking
- Drying to the optimum moisture level in tiled/concrete yard
- Hulling

**XII. (i). *Grading/garbling***

- Storage at optimum moisture, optimum humidity and at optimum temperature in clean ventilated godown away from hazardous chemicals
- Packaging





## **Fruits and Vegetables**

*K.V. Divakaran, M. Prakash, Mathews L. Paret,  
George Mundakkal & Raveendran.T*

## Chapter VI

### FRUITS, VEGETABLES AND TUBERS

#### I. Introduction

The decision taken by the Government of Kerala to set up Agri. Export Zones in nine district of Kerala is a welcome gesture. Inclusion of Wayanad in the list maybe required.

Organic farm products are going to play a significant role in the consumer market in future. Markets in developed countries are future destination for producers from developing nations. But sufficient information about demand and production of organic farm products are not readily available. The emergence of a new trend for organic farming in India is a positive sign. Farmers big, small or in groups will have great opportunities to market organic produces.

While considering opportunities for export, the scope of **Wayanad based products** cannot be ignored. The analysis of agricultural organic products for exports clearly indicates that about 85% of the total volume of exportable commodities can be generated from Wayanad. Moreover a trend has already been set-in to produce organic farm products on a commercial scale. Concerted efforts are being made for sustainable development in the agriculture sector through organic practices. Wayanad lies in the Western Ghat and has natural buffer for effectively realising the goals of sustainable organic agriculture. Therefore the products available from Wayanad will attain greater importance in the international market. *These factors indicate that the claim of Wayanad to set up Agriculture Export Zone is foremost.*

Besides an analysis of CEBECO report clearly reveals that Banana is one of the produce projected for export from Kerala. Wayanad is top most both in area of cultivation and production of Banana in Kerala, while with regard to productivity ranks second. Considering a venue for promoting export of Banana, Wayanad is an ideal location.

#### II. Organic agriculture in India - History and Development

The concept of organic farming was in vogue in the traditional system of agriculture in India. Crop rotation, legumes mixed crops, botanical pesticides were in practice from olden days. There is a emerging trend to switch over to organic cultivation in the country. This may be due to the effects of Government and non-governmental agencies awareness programmes.

In Kerala especially in Wayanad this trend is gaining momentum because of the following reasons.

- Products fetch a premium price.
- It is eco and health friendly.

- Organic farming is more suitable to the agro economic condition of the district.
- Botanical inputs can be made available with the application of traditional knowledge.

Table. 1. Major products produced in Kerala by organic farming

Type	Products/ Commodities
Cereals	Rice
Beverages	Tea, Coffee,
Spices	Cardamom, Pepper, Ginger, Turmeric, Vanilla
Fruits	Mango, Banana, Passion fruits etc
Vegetables	Bitter-gourd, Beans, Leafy vegetables
Others	Herbal extracts

Out of the most common products grown organically in India products like tea, spices, fruits, vegetables, Rice (scented), coffee, herbs etc are popular in Wayanad and many of them can claim **geographic specialities**.

Similarly, out of the organic products exported from India several items stated above are produced in Wayanad. These items are sold both in internal and international markets. Wayanad being situated in one of the 21 agro-ecological zones, products from here will have a comparative advantage due to **special characteristics**. The comparative advantage of Wayanad district to produce and export Organic and speciality products can be justified on the following basis:

- Wayanad has a **special agro climatic zones**, since it lies in the **Western Ghats**.
- There are many **tribal groups** who still adopt **traditional system of farming**.
- Wayanad coffee, pepper, scented rice etc are already known in the export market.
- Comparatively cheaper and adequate labour is available here since 80% of the population is earning a livelihood from agriculture and allied activities.
- Adoption of organic farming systems has already been initiated.
- NGO (Non-Governmental Organisation) net work in Wayanad is strong and effective.

- Institutions like Ambalavayal research station, M.S. Swaminathan Research Foundation, Brahmagiri Development Society, Coffee Board Research Station, Spices Board etc can provide support to the farming community.
- The land distribution of land among **Adivasis** in the **Sugandagiri** and similar areas can provide ideal venues for experimenting traditional organic farming.
- Other infrastructural facilities are now being provided by KINFRA, District Rural Agricultural whole sale Market etc.
- The virginity of the soil, compared to other district is still maintained, which is ideal for innovative farm practices.
- Per capita availability of cultivable land is high in Wayanad.
- The inputs essential for practicing organic farming viz. Bio-mass, Bio-manure, Botanical pesticides, Traditional knowledge etc are available in Wayanad.
- SHG network in Wayanad has gained strength to take up new challenges.
- The exportable **agro bio-diversity** is very wide. eg: Forest produce, Honey, Herbs etc.
- Financing institutions like NABARD, Lead Bank, Co-operative Banks and Local Bodies (Planning Fund) are active.

The SECO projection of products which have a growth potential over the next five years includes the following items which have significant production in Wayanad.

Table. 2. Projected export demand for selected organic products

Spices	14%
Tea	13%
Rice (Scented)	10%
Banana	15%
Herbal extracts	7%
Coffee	7%
Honey	5%

Similarly among the Indian products that have an advantage in the export market, products like tea, coffee, pepper, rice (scented), vegetables, fruits, herbal extracts are cultivated in Wayanad. Natural honey can be collected and exported from the forest in Wayanad.



Cost-wise, organic products fetch a premium price compared to conventional products.

Table. 3. Price comparison between Organic & Conventional products.

<b>Product</b>	<b>Organic (price Rs. /kg)</b>	<b>Conventional (price Rs. kg)</b>
Rice	32 - 110	15 – 60
Wheat	35 - 40	15 – 25
Coffee	475 - 1000	350 – 500
Tea	450 - 1300	250 – 500
Spices	400 - 1500	250 – 800
Pulses	50 -75	25 – 40
Fruits	80 - 100	20 - 100

### III. Demand for Indian Organic products in domestic and export markets

#### III. (a), *Domestic Market*

Wholesalers and super markets play a major role in marketing organic products. Whole salers trade about 60%. Large and organised producers have their own outlets (eg: tea). Metropleitian cities like Mumbai, Delhi, Kolkatha, Chennai, Bangalore, Hyderabad are the chief internal markets for organic products. Sale of organic produces in domestic market is only 7.5%.

Table. 4. Domestic market consumption

<b>Product relevant to Wayanad</b>	<b>Sales (Tons)</b>
Tea	100
Coffee	50
Spices	NA
Rice (scented)	250
Fruits & Vegetables	400

Table. 5. Future demand for the next four years:

<b>Year</b>	<b>Tons</b>
2003-2004	1257
2004-2005	1353
2005-2006	1457

2006-2007	1568
-----------	------

### III. (b). *Export Market*

Exporters are the main players. Tea is marketed directly by big Tea Estates. Main countries to which the export take place are:

Europe, Netherlands, U.K, Germany, Belgium, Sweden, Switzerland, France, Italy, Spain)

Americas (USA, Canada)

Middle East (Saudi Arabia, UAE)

Asia (Japan, Singapore)

Australia

Africa (South Africa)

Table. 6. Export sale (Product wise relevant to Wayanad in 2002)

Product	Sales (Tones)
Tea	3000
Coffee	550
Spices	700
Rice	2500
Herbal products	250

Table. 7. Projected market demand for organic products

Year	Tons
2003-2004	15050
2004-2005	16930
2005-2006	19080
2006-2007	21525

All players in the exports or internal markets are outside Wayanad, although several of the products originate here. Products from Wayanad are also in the export list, but the benefits of premium price reach only the exporters or wholesalers. Hence the remedy is to have an alternative system of export that helps the farmers. The following table shows the real position of export products and domestic markets.

Table. 8.

Product	Players	Qty. (ton)	Season	Markets
Tea	Arya tea co. Ltd Kolkata Bombay Burmah Trading Corporation Combatore, Chamong tea Pvt. Ltd Kolkata, Hindustan Lever Ltd. Nilgiri, Tea Promoters India, Kolkata	3500	Throughout the year	Domestic: Mumbai, Bangalore, Delhi & Hyderabad Export: Australia, Germany, Japan Netherlands, UK, USA
Coffee	Arogya organic coffee Cultivation, Chikmanglur, Bombay Burmah Trading Corporation, Combatore, Peeremade Development Society, Idukki Poub organic products Pvt Ltd, Pallakad Yellikodge Estate, Chikmanglur	600	Monsoon June to September	Domestic: Bangalore, Chennai Hyderabad Mumbai and Delhi Export: Australia, Germany, Japan, Netherlands, Sweden, UK, USA.
Spices	Accelerated Freeze drying Co. Ltd, Cochin, Cochin Spices Ltd, Cochin Lotus Spices Ltd, Cochin, Peeremade Development Society, Idukki, Unicon Natural Products (Ltd. Hyderabad)	700	Throughout the year	Domestic: Bangalore, Chennai, Hyderabad, Mumbai, Delhi Export: France, Germany, Japan Netherlands, South Africa Singapore, UAE, USA.
Rice	Indian Organic Food Delhi, Ion Exchange Enviro farms, Pune, Grewah Organic Agriculture farms, Sirsa, <b>Pieric</b> Ltd, Sonapat, Sunstar Overseas Ltd, <b>Bahalagach</b>	3500	Kharif: April to Septmeber Rabi: November to February	Domestic: Bangalore, Chennai, Hyderabad, Mumbai & Delhi Export Japan, Singapore, UAE, USA, Canada, Germany
Fruits & Vegeta	<b>Grewab</b> Organic Agriculture Farms, Sifcs, Mahesh Agri. <b>Exm</b> Pvt.	2500	Throughout the year	Domestic: Mumbai, Chennai, Bangalore Delhi & Hyderabad

bles	Ltd, Surat, Ion Exchange Enviro Farms, Pune, IQF foods Ltd Banglore, Namadharis Fresh, Banglore, <b>Picrk Ltd.</b> <b>Senepat</b>			Export: Australia, France, Germany Italy, Sweden, Switzerland, Netherlands, USA, UK
Others	Medical Rohini Herbal, Chennai herbs & Khadinge plants and extract herbs pvt. Ltd.	250		Domestic: Bangalore, Delhi & Hyderabad Export: Australia, Belgium, Germany, Switzerland, Italy, Japan, Netherland, UK & USA

### **III. (c). Major Destinations for Organic Products**

#### **III. (c).1. Japan**

Organic market in Japan is quite promising Japanese have high purchasing power and are conscious about health foods. They spend about 660 billion US \$ on food, which is increasing every year. The organic food sales is around 2.5 to 3 billion US \$. Around 360 million US \$ worth organic food is imported into Japan and the yearly growth in the Organic Market is around 40%.

#### **III. (c).2. US**

US is the worlds largest organic food consumer. Around 9.5 billion US \$ worth food is sold in the US, which in 2002 reached 20 billion US \$. According to a survey, developing countries have great opportunities in the following category of products for export to US:

- Tropical products like coffee, tea, fruits and vegetables.
- Off-season vegetables spices, herbs and grains.

This trends can be exploited by growers fromWayanad.

### III. (c).3. *European Market*

Germany, UK, Switzerland, Denmark etc are potential market for Indian organic products. Only 23% of traders imported Indian organic products to the above region. The following table show the scope of Wayanad products in export market.

Table. 9.

<b>Product</b>	<b>Volums (tons)</b>	<b>Season</b>	<b>% of turn over</b>
Tea (Green & Black)	65	Throughout the year	10 – 15
Spices (pepper, ginger & Libiscus)	132	Throughout the year	10 – 15
Fruits (Mango and pineapple)		160 - May- July	6 – 10
		Nov - May	

There can be a growth rate of 10 to 15%. Out of the organic products listed, Wayanad can attain significant performance in export / domestic market if made available.

Out of Tea, Rice, Spices, Vanilla, Bananas, only organic tea is now available. Banana is sold in good quantity. Even neighboring countries like Srilanka, China, Thailand are potential markets, where scented rice varieties, tea, coffee, banana, vanilla are favoured. Export depends chiefly on quality, price, reliable volume etc

SECO projects a demand chart for the following commodities.

<b>Box. 1.</b>	
Banana	6400 mt
Ginger	200 t
Spices	200 t
Vanilla	10 tonnes

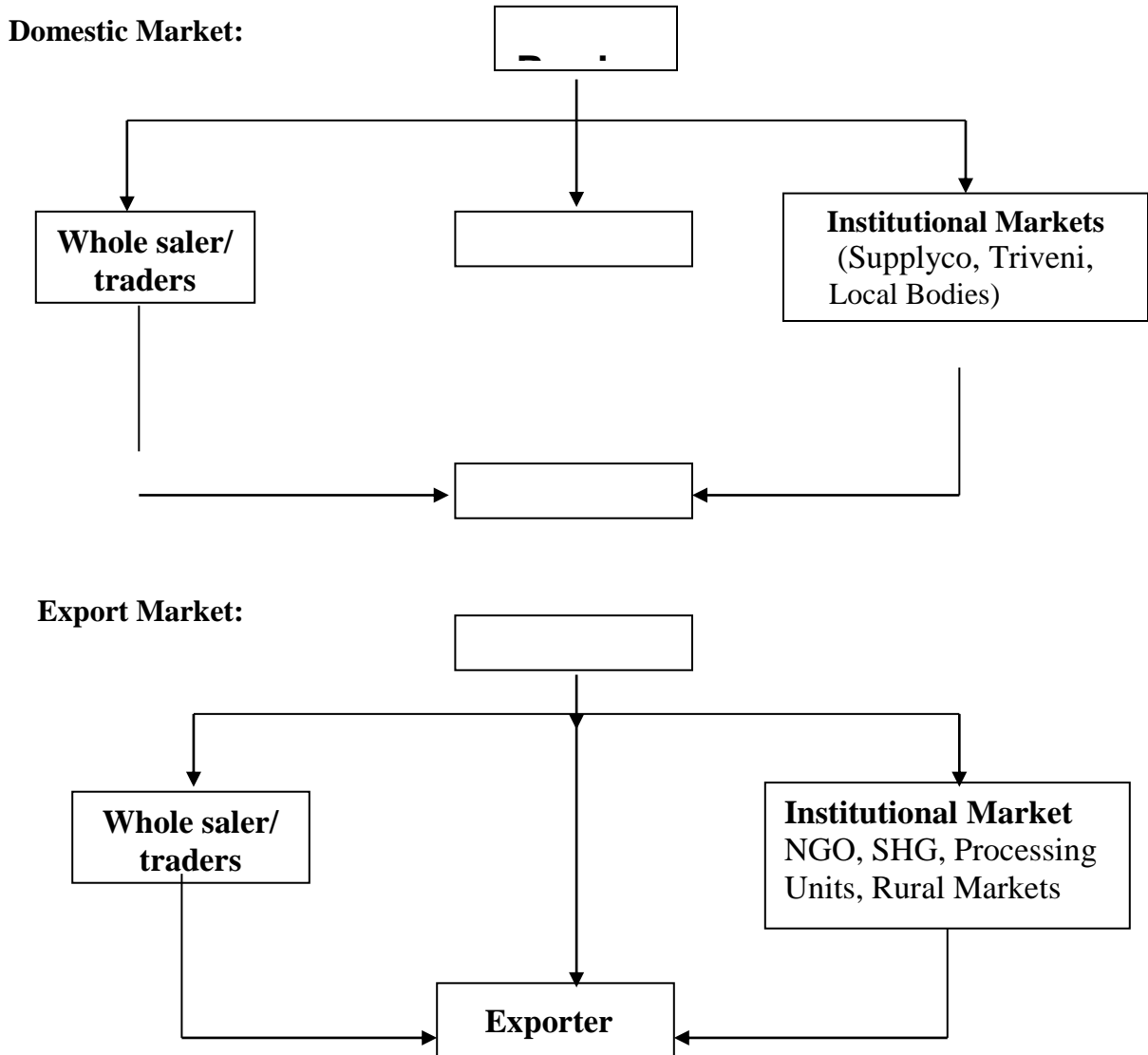
Premium price expected are about 50% plus.

### IV. **Structure of Sales channels**

The existing sales practice is not based on quality. Although farmers are prepared to produce that can meet various standards, due to the lack of trade practices they are compelled to sell their products for a rate common to all grades. Besides, farmers of

Wayanad are not getting premium price for their products which are superior due to **geography** and **climate**. But traders are deriving this benefit when they export Wayanad products under branded names. In addition, traders are also in the habit of blending inferior products from other places with the superior Wayanad products. Therefore the Agri Export Zones can facilitate trading in different grades and to bring additional financial benefits to the farmers. This process will ensure a better price to producers and can compensate the loss now experienced by them.

A distribution channel for domestic and international market is proposed below:



There are different channels for sales like supermarkets, traders, wholesalers etc. among which supermarkets are popular. Future sales will increase considerably

through the supermarket net work. There are several obstacles for the marketing of organic products.

<b>Aspect</b>	<b>Obstacle</b>	<b>Solutions</b>
Price	“Price expectations are too high in relation to quality.”	The export traders from India should have realistic prices
Quality	“Low consistency of quality; contamination.”	The quality must be consistent. For this reason, higher quality standards must be enforced to develop and maintain a good reputation. Post-harvest practices should be improved.
Availability	“Reliability of exporters.”	Promotional from Indian traders and governmental institutions. Better understanding of the demands of buyers (small quantities). Suppliers must show financial stability.
Logistics	“Slow shipment, restrictions for importing Indian organic products.”	The logistics must be better coordinated from the place of dispatch for shipment. Duty ports must reduce the time taken to complete the customs process. Enhance the infrastructure available to guarantee quality upon arrival (cool rooms).
Certification	“Lack of national certification and accreditation.”	Local certification bodies accredited by national and international organizations would enhance the acceptance of organic products from India.
Export authorities	“Time consuming and complicated paper work.”	Develop a fast track for export.
Information	“Lack of information on availability and certification.”	More promotion activities on the part of traders, farmers and governmental institutions (e.g. international fairs). Establish an internet portal to enable easy access to information on Indian organic products.
Administration	“Inconvenient modus of payment (letters of credit); the system is too slow.”	Indian traders must show more flexibility in modus of payment. The bank’s systems must reach higher governmental bank’s standards.
Customer Service	“Poor customer service from the Indian traders after sales.”	Improve service quality; in particular, client follow-up systems must be implemented. Traders must accomplish what they promise.

The analysis clearly indicates that infra structure and awareness facilities are to be provided to induce production and marketing of organic products for which Wayanad has enough scope.

## V. Recommendations:

In order to improve / promote organic farming, various steps require to be taken at various levels:

Category	Problems	Strategies
Small farmers	<p>Lack of proper infrastructure (for production and logistic);</p> <p>Lack of proper organization and domestic marketing network;</p> <p>Lack of marketing initiative (during the conversion period and when they have been certified);</p> <p>Lack of funds during the conversion period and certification.</p>	<p>To organize small farmers to act as an organization that produce and market their own products for the domestic and export markets;</p> <p>Training programs for farmers and NGOs not only in organic agriculture methods (production harvest and post harvest techniques, basic standards etc.), but also in how to sell, promote and diversify their markets and how to fulfill certifications requirements (internal control and administration);</p> <p>To include small farmers in the operative organizations of the hole chain (from production over processing through to final sales outlet);</p> <p>Farmers should have access to financial support for organic production, administration, group certification and marketing programs for their products;</p> <p>To offer continuous organic market information to farm organizations and direct contact to possible buyers;</p> <p>To promote organic products in national and export markets where farmers can participate, for example: national and international fairs, commercial missions to specific export countries.</p>
NGOs	<p>Lack of funds;</p> <p>Not organized;</p> <p>Lack of proper infrastructure.</p>	<p>Training on basic standards, organic production methods, documentation, inspections and certification;</p> <p>To offer continuous organic market</p>



		information.
Traders	<p>Lack of proper marketing network and marketing implementation;</p> <p>Lack of domestic and export marketing initiatives.</p>	<p>Training programs for traders in how to promote and sell organic products in the domestic and export markets (e.g. improve client follow-up system, reliability, to understand the customers, etc.);</p> <p>To organize commercial mission to specific countries in order to meet potential customers, improve and enhance relationships and to understand the market.</p> <p>To offer continuous organic market information and direct contact to possible buyers.</p>
Certification	<p>Cost and quality emerge as major constraints for certification;</p> <p>Lack of national certification and accreditation.</p>	<p>Implementation of the national certification agencies that should provide: comprehensive policy prices (reduction in cost of certifications), international standardization and simplified certification procedure with less documentation.</p>
Processing Industry	<p>No easy availability of organic raw materials;</p> <p>Little knowledge on the requirements for the processing of organic products;</p> <p>Availability of upgrade processing technologies.</p>	<p>Raw materials to be made easily available (e.g. publication of organic products in a national data base);</p> <p>Training on basic standards, organic processing methods, documentation, inspections and certification.</p>
Government	<p>Low involvement</p> <p>Lack of subsidies especially to small farmers</p> <p>Extensive documentation (e.g. export documentation);</p> <p>Delay in policy implementation;</p> <p>Promote only the export market, less effort to develop domestic market.</p>	<p>Improve organic national rules and regulations;</p> <p>Achieve recognition on the international level;</p> <p>Promotion of organic farming through training programs, financial help and subsidies to small farmers;</p> <p>Improve image of Indian organic products and trade (domestic and export promotion);</p> <p>Facilitate the implementation of a producer, traders, processors national</p>

		database. Support domestic marketing initiatives.
Domestic customers	Lack of awareness of organic products  High prices	Increase awareness through promotion of the organic products by producer, traders, NGOs, GOs;  Communications of the benefits of organic farming (health food, protection of the environment and the biodiversity, etc.);  Formation of moderate prices in order to make accessible organic products to a bigger part of the society.

#### Fruits, vegetables & tubers - some facts from CEBE co report

Banana (India - 1999-2000)		
Area (Ha) 490.7	Production (Mt) 16813.5	Productivity (Nt/Ha) 34.3
Banana (Kerala - 1999-2000)		
Area (in 000 Ha) 27.9	Production (00 Mt) 393.7	Productivity (Mt/Ha) 14.1
Vegetables (India 1999-2000)		
Area (in 000 Ha) 5993	Production (00 Mt) 90831	Productivity (Mt/Ha) 15.2
Tapioca (India 1999-2000)		
Area (in 000 Ha) 234.8	Production (00 Mt) 3181.1	Productivity (Mt/Ha) 26.3
Tapioca (Kerala - 1999-2000)		
Area (in 000 Ha) 109.3	Production (00 Mt) 2563.5	Productivity (Mt/Ha) 23.5
Exports (India)		
	Fruits	Vegetables
Banana	- 8630	Pumpkin - 273
Pineapple	- 757	Others - 28934
Papaya	- 11928	

#### Production of major fruits and vegetables in Kerala and Wayanad

Area (Ha) under fruits production 2000 -01			
Products	Wayanad	Kerala	Position of Wayanad
Banana	8935	45059	Top
Jack	11320	93698	Second
Mango	5409	90571	Nineth
Other plants	2152	54353	Thirteenth
Pineapple	63	10692	-----

Papaya	368	44066	-----
Other fresh fruit	817	12571	Eighteth

#### Production in Metric Tone - Fruits - 2000-01

Products	Wayanad	Kerala	Position of Wayanad
Banana	67547 (Mt)	327955	Top
Jack	33 Million nuts	313 (Mn)	Second
Mango	9235	259635	Thirteenth
Other planted	19078	403695	Fourteenth
Pineapple	236	84599	----
Pappaya	2457	63008	-----

#### VI. Productivity

In Banana Wayanad has a productivity of 7.6 whereas Kerala average is 7.28

#### Vegetables & Tubers 2000 – 2001

Commodities	Wayanad		Kerala		Position
	Area (Ha)	Production	Area (Ha)	Production	
Tubers	1727	-----	28449	-----	8 <sup>th</sup>
Tapioca	1620	54917	114609	2586903	30 <sup>th</sup> /12 <sup>th</sup>
Bitter gourd	100	-----	1817	----	9 <sup>th</sup>

Banana cultivation in Wayanad has gained momentum and is replacing paddy rapidly. Although this trend is creating environmental problems, especially in water and soil conservation, this crop is able to, provide a livelihood to many farmers whose income from paddy was very low. Banana is cultivated mainly on contractual terms. Landowners get a reasonable income as lease amount, which currently ranges from Rs.7000 – Rs.8000 per acre. The adverse effect on ecology due to widespread banana cultivation can be averted by proper water and soil management and organic farming techniques. Interestingly, Wayanad tops in area of production of Banana although the productivity is lower, compared to other places.

Crop	Area in ha	Production in M.T	Productivity in kg/ha
Banana	10174	75264	7398

Productivity can be tripled even in the existing area with the application of available technology.

The District wise data indicates that only 2% of the vegetables to Wayanad are from other states (1996 survey).

#### VII. Economics

No reliable figures are readily available. A detailed survey of each crop has to be carried out to work out the cost factors. The fluctuations of price are mainly influenced by seasonal festivals like *Onam*, *Vishu*, *Christmas*, *Ramzan*.

### **VIII. Socio - Economic Importance**

Every household in Wayanad grow fruits, vegetables and tubers of one variety or the other. In the case of Banana, small and marginal farmers are mostly involved. Fruits like Jack and mango are grown in almost all holdings. Vegetable cultivation in large scale is now undertaken by SHGs, Harithsangams and individuals on lease basis. Banana, tapioca and ginger have attained a status of livelihood crops especially to those who does not own land. Hence these agricultural practices have great impact on the economy of Wayanad households.

### **IX. Present infra-structural facilities.**

Farmers are dependent on Krishibhavans and Ambalavayal Research station for information.

The only value addition activity in the case of banana namely chips making.

Other facilities like storage, grading, certification are not presently available here.

### **X. Marketing channel**

Usual channel of marketing in Wayanad is farmer to local agent to wholesaler to retailer to consumer. But in the case of banana and ginger, large growers sell their produce to the wholesalers. Jack fruits are collected by local agents and sold outside Kerala. In the case of vegetables, cultivators sell their produce in adjacent market or even to the consumers directly.

### **XI. Prospects of Export**

Detailed study is required to understand Wayanad perspective. Organic products can be promoted. (eg. Maarappan Moola)

### **XII. Strategies to be adopted (Banana)**

Targeted quantity of production = 2, 56, 000t (productivity @ 25t/ha)

Area of cultivation to meet the required quantity of production = 10250 ha (Nenthran)

1915 ha (table varieties - poovan, njalippovan, robesta, grand naine etc)

Location of production – Wayanad

Organisational set up proposed

Units of production - individual and group

Methods of farming - group farming

Awareness and training - KAU\*, CFTRI

### **XIII. Value addition and processing**

#### **XIII. (a). *Semi Processing***

Table purpose varieties of banana - packing of hands or dehandeds fruits in polythine is promising

#### **XIII. (b). *Process end product Nenthran***

Various products like banana chips, halwa and sweets, baby food, banana fig, flour, powder, jam and dehydrated core slices etc can be made from Wayanad. (Technology has already been developed)

### **XIV. Marketing**

In the case of banana (Nenthran) and other plantain varieties Wayanad can play a significant role in export and internal markets. So AEZ facilities have to be set up here as well. Fruits like AVECADO, LICHI, can be grown here due to favourable geographic and climatic conditions. These fruits are in great demand in the international market. Similarly, cowpea and bitter gourd and gupa are known to have good takers in UAE and other countries. The setting up of AEZ will be a great relief to the farmers of Wayanad who are now looking for new avenues.

### **XV. Conclusion:**

According to the CEBECO Report the concept of AEZ is described as follows: “The concept of Agri Export Zone thus attempts to take a comprehensive look at a particular produce/product located in a contiguous area for the purpose of developing and sourcing raw materials, their processing/packaging, leading to final exports. Thus, the entire effort is centered on the cluster approach of identifying the potential products, the geographical region in which these products are grown and adopting an end-to-end approach of integrating the entire process right from the stage of production till it reaches the market.....”. The Wayanad scenario fits into this concept. Moreover the potential of Wayanad, especially in the agriculture sector has not been, exploited even now although several developmental activities have been initiated. The varieties diversity of exportable products, the geographical and climatic conditions, the aptitude of the farmers to adopt innovative farming are favourable to be set up AEZ.

Among the fruits which are most wanted in the export market Banana is important, since, Wayanad produces the largest quantity of Banana in Kerala. The scope of exploiting the potentiality of value added products from Jackfruits is also immense. Similarly as a vegetable, Ginger can also occupy a predominant position in the export.

## **XVI. Limitations:**

Reliable data on production, market trends, costing, credit pattern etc about fruits and vegetables of Wayanad are not readily available. An exhaustive survey has to be conducted to obtain the above statistics and has to be initiated immediately.

*Ref:- CEBECO Report 2002, SECO Report2002.*



## INFRASTRUCTURE

*P.S. Radha Krishnan, Pundarikakshan & K.C. Abdul Gafoor*

### Chapter VII Infrastructure

#### I. The Infrastructure

Wayanad is the only one district in Kerala that shares boundary with two States, namely Tamil Nadu and Karnataka. The total road distribution in the district that comprises of National Highways (NH), State Highways, District Roads and Village Roads, is around 636.68 Km. The NH 212 is passing through Wayanad District. It has a link with major cities like Kozhikode, Mysore, Bangalore, etc. Road transport connection links Wayanad with other cities like Kochi, Coimbatore and Mangalore. The nearest railway station located at Kozhikode is about 70 Km away from Kalpetta, Wayanad. The nearest Airport located at Kozhikode is approximately 100 km away from Kalpetta, Wayanad. The proposed Kannur and Mysore Airports will be an advantage for air transport.

The Postal Department of Govt. of India has a good network of Post Offices in the district. Private courier service agencies have opened their service centres in major parts of the district. In telecommunication side, BSNL covers the entire area and extending both land phone and mobile phone facilities. E\_communication system is also extending Inter-net service facilities to Wayanad District.

#### II. Electricity

The present installed capacity of the main 220 KV sub station at Kaniambetta is 85MW. Night peak load and day peak load of the station is 28 MW and 17 MW respectively. The above load also shares 3 66KV sub stations. 4 numbers 33 KV substations are in the final stage of completion. **At present there is no power shortage in the district.**

#### III. Major Institutions

There are various institutions working in the area of agriculture and rural development. Selected important institutions listed below

1. Coffee Board :- Coffee board operates in this district under three wings
  - a) Research wing
  - b) Extension wing
  - c) Marketing wing
2. Regional Agricultural Research Station:- RARS, located in Ambalavayal functions as a part of KAU. This station caters to the research needs of agricultural sector of high ranges. The station mainly concentrates the research on spices, tropical and subtropical fruits, vegetables, especially cool season vegetables and hill paddy. A



Krishi Vigyan Kendra, with the objective of dissemination of latest technologies to the farmers, is also attached to this station

3. Agriculture Department, Govt. of Kerala:- The Krishi Bhavan under the state agriculture department is functioning in every Panchayath. Principal Agriculture office located at Kalpetta
4. Rural Agriculture Wholesale marketing Division, Sulthan Bathery:- Intended to help rural farmers in fair trade
5. M.S. Swaminathan Research Foundation:- Helping local communities in conserving and sustainably utilising biodiversity of the area
6. Brahmagiri Development Agency
7. Ambedkar Memorial Rural Institute for Development (Amrid)
8. Soil Conservation Dept.
9. Minor Irrigation Dept.
10. Various other Govt. Departments

Apart from the above mentioned institutes, NGOs have a strong network in the district.

#### **IV. Observations of DIC.**

No major industrial estate except KINFRA at Chundale exists in the district. It is earmarked for food and herbal industries. There is one MIE at Sultan Bathery owned by SIDCO. It has 10 sheds and all are occupied. Wayanad District Panchayath has purchased 6.73 acres of land at 5 places for industrial development. Mananthavady block panchayath has purchased 1 acre land for the same purpose.

Agriculture based industries have good potential in Wayanad. Raw materials are taken out of the district and value added products are brought into the district. Market potential for consumer and consumable items in the district are very high. Subsidy at 25% of the fixed capital investment is granted to agro and food based industries. The ceiling is Rs 25 lakh.

#### **V. Credit facility from banks.**

The district has a good net work of bank branches, lead by the short-term co-op. structure along with its primary societies (40), followed by RRBs (28), Nationalized banks (24), SBI Group (11), private sector banks (10) and ADBs (2) in that order. The credit to deposit ratio in the district is always at a very high level- above 100% as compared to below 50 % of the state as a whole.

The district credit plan for the year 2003-04 projected the priority sector lending at Rs.398.60 crore, a growth at 13.60% over the previous year. If we study the projections in the past , it is in this year that the banks have indicated a higher level of projection. Further the agri. and allied activities accounted for 68% of the total priority sector projected for 2003-04. There fore bank credit alone will not be a problem in the year for achieving the desired growth relating to selected crops.

Bank finance generally covered all the traditional and routine activities in the farm sector. The specific areas, now relevant, are also, therefore, covered and included such as

purchase of land, Agri clinics/Agri business, Rural godowns, food and agro processing etc.

In the Non farm sector, bank finance is available under composite loan scheme, integrated loan scheme, agro-industry etc..

All the investment schemes formulated by NABARD are aimed to be implemented generally by all banks.

Commercial banks also provide packing credit at pre shipment stage for exports.

## **VI. Focus on NABARD Re-Finance Assistance**

### ***VI.(a). Refinance scheme for financing farmers in the 'AGRI EXPORT ZONE' under contract farming.***

The Finance Minister in the budget speech for the year 2001-02 announced the formation of the AEZ in select areas of different states. Later it was also incorporated in the EXIM policy. Nabard on its part identified this as a thrust area and decided to provide refinance to commercial banks for financing farmers for cultivation/production of identified crops/commodities in the AEZ under contract farming.

## **VII. Contract farming**

The features of contract farming are that selected crops are grown by the farmers under a buy back arrangement with an agency engaged in trading or processing. Small farmers are generally capital starved and contract farming is encouraged under these situations because production of small farmers can be more successfully organized through this mode.

Contract farming of different types is already in practice for certain commercial crops like coffee, tea, vegetables cotton, etc. There are a number of success stories on contract farming such as Pepsico India in respect of potato, tomato, ground nut and chilli in Punjab, safflower in M.P., Oil palm in A.P, and Amul and NDDDB for milk procurement are some of the success stories.

### *Advantages of contract farming*

- The farmer enters into a forward contract with the processor/contactor to supply the produce at a predetermined price, quantity and quality and the buying company also provides necessary inputs and technology to the farmers so as to ensure steady supply.
- It helps the small farmers to participate in the production of high value crops.
- Farmer takes the production risk and the exporter takes the price risk. In some cases both are taken by the latter.

- Risk of non availability of raw material is minimized as the farmer will ensure it.
- Small and marginal farmers cannot be competitive with out access to modern technology, contract farming helps in this.

*Advantage to bankers*

- Direct between farmer and exporter will provide easy access to the market and reduces the cost of supervision of such accounts.
- Since all the risks are taken by the exporter the chances of post harvest losses are minimized.
- Due to remunerative realization of price the farmer may augment the deposit base.

*A word of caution*

- The transparency of contract should be ensured.
- Legal protection to contracting parties.
- Formation of farmer's organization to manage their relationship with the exporter as equal partners.

*Salient features of the scheme are:*

- Encouraging contract farming
- Encouraging agri export by banks
- Provision of refinance to commercial banks
- Provision of 100% refinance.
- Rate of refinance at 6.75%
- Repayment by banks in 3 years-bank to Nabard.

**VIII. Scheme for financing farmers for purchase of land.**

Term finance to small and marginal farmers, share croppers and tenant farmers.

- Purchase of agriculture land to cultivate.
- Margin-20%
- Security – the land purchased will be mortgaged in favour of the bank.
- Quantum of loan - area of land to be purchased and valuation.
- Repayment period- 7 to10 years.
- 90% refinance to CB, RRB and DCB – 95% to pcardb.
- Interest - 8.5%.

**IX. Agri clinic/agri business centres by Agri. graduates**

Launched in consultation with GOI and some banks

To supplement the existing extension net work.

- Clinics - to advise to farmers on cropping practices, technology, crop protection, pests/ diseases management, market trends and prices
- Business- Input supply, farm equipments on hire and other services.
- Individual or group can apply for the loan
- 10 lakh for individual – project cost-50 lakh for group.
- Covered under ARF
- If under ARF-project cost limit is Rs 25 lakh-refinance limit is Rs 15 lakh.
- Above Rs.25 lakh may be submitted to Nabard for prior approval.
- Refinance-100%
- Margin as per RBI norms
- Security- as per norms
- Repayment period-5-10 years
- Interest to banks-7.75%

#### **X. Promotion of agriculture projects-co financing with commercial banks**

- Loan issued to ultimate borrower will be shared up to 50 %
- Rate of interest will be decided in consultation with the bank.
- Security, custody of documents release of funds etc can be decided in consultation.
- It can also be jointly appraised.
- Technical cell available in Nabard can also be used for the same.

The following banks have already executed MOU with Nabard in this regard. UBI, DENA BANK, CBI and CORPORATION BANK.

#### **XI. Capital investment subsidy scheme for construction of cold storage**

# Gramin bhandharan yojana

- Individuals, groups, NGOs companies co.operatives, SHGs etc can apply
- Location - the cold storage should be out side of the municipal corporation limit
- Capacity - Minimum 100 MT
- Specification be as per PWD.
- License under state warehousing act.
- Implemented by Directorate of Marketing and Inspection.
- Subsidy-33.33%
- Amount of subsidy ceiling-10000 MT and amount ceiling is Rs 50 lakh.
- Refinance is not compulsory.
- Subsidy will be released through Nabard in 2 installments.
- Subsidy will be back ended.
- Margin----- 20%
- Bank loan-----46.67%
- Subsidy-----33.33%

## **XII. Refinance under NFS**

- ARF limit is Rs 50 lakh
- Composit loan scheme-Rs 10 lakh
- Integrated loan scheme.Rs.50 lakh for cbs and Rs.20 lakh for other banks.
- Schemes under pre sanction procedure.
- Soft loan assistance scheme. not more than 20% of the project cost –ceiling Rs.5 lakh. interest free.

## **XIII. Rural Infrastructure Development Fund (RIDF)**

9<sup>th</sup> tranche has been approved by the finance ministry.

Rs.5500 cr.

Total corpus- Rs.34000cr ( RIDF-1 to 9 )

It covers: irrigation, roads, bridges, water supply, sanitation, rural energy, rural market yards, education, health, communication and information technology.

## **XIV. Conclusion**

- There is sufficient banking net work to meet the programme (AEZ) expectations if comes through.
- Sufficient funds have already been allotted under the District Credit Plan to meet the credit requirements of farmers under the agri allied sector and the non-farm sector.
- As indicated by the KSEB there is no power shortage in the district at present.
- National Bank has already formulated a scheme for meeting the requirements under AEZ especially in the area of contract farming and issued detailed circulars to all the banks.



## **Agri Export Zone: Prospects of Wayanad District Executive Summary**

### **Chapter VIII**

#### **Agri Export Zone: Prospects of Wayanad District Executive Summary**

Wayanad is located on the North Eastern part of the state at a distance of about 70 Km from seashore. Its elevation ranges from 700 – 2100 meters above MSL. This district receives an average rainfall about 2000mm to 3000mm per year and it is spread over a period of 9 to 10 months. Wayanad is blessed with hot humid climate. The minimum temperature ranges from 14.5° C to 20.2° C and maximum temperature ranges from 25.1° C to 32.6° C respectively. Relative humidity is very high which goes even above 90% during South West monsoon period. Ideal climate coupled with conducive soil profile, rich in organic matters, make the district the home of many aromatic crop plants.

More than 90% of the total population depends, either directly or indirectly, on agriculture and allied activities for their livelihood. The land man ration is high in Wayanad District which paves the way to profitable farming. A notable feature of this district is that the presence of educated youth willing to adopt modern technology in crop production.

This district has got a good potential to convert into an organic agriculture zone. Traditional farming communities, rich biomass, traditional wisdom in using plants as biomanures and biofertilisers and its peculiar geographical settings etc make this district ideal for organic farming.

Medicinal plants are the future crops of Wayanad. A survey conducted by MSSRF shows that there are about 650 species of medicinal plants occurred in the district and it falls in the list of the 29 Plant Diversity Centres identified from Western Ghats that is rich in medicinal plants. The district is also rich in ethnobotanical information, medicinal uses etc. The National Medicinal Plant Borad has recommended large scale cultivation of 32 species of medicinal plants out of which 20 species can be cultivated in Wayanad.

The conducive atmosphere, richness and diversity of medicinal plants enhances the scope of allied sector development like Herbal Spa, Health tourism, Herbal Park with rejuvenation centre and treatment facility on multiple systems of medicine, Herbal extraction centre, Nutraceutical and Herbal Cosmetic industry in Wayanad District. The study highlights the development of following infrastructure for tapping the medicinal plant wealth in sustainable and equitable ways.

1. Semi processing at collection centres with terminal market and packing facilities
2. Common facility centre with GMP license which provide facility for women SHGs to convert their raw drugs into value added products
3. Super critical fluid extraction unit and advanced technology for herbal extraction
4. Drug Manufacturing units (Private, Quassi Govt., Co-operative ownership)
5. Research Centre for dealing with Conservation, Research and with IPR issues
6. Lab facility for developing new drug formulation
7. For ensuring fair market, there should be warehousing facilities, logistic support for processing, semi processing and market information

Spices being another important area for considering for establishing an AEZ. Under spices, Pepper, Vanilla and Ginger are the main potential crops in terms of inherent qualities and area under cultivation. The world famous Malabar and Telichery pepper, which are enjoying premium market advantage in international market are from Wayanad District. The highly responsive farming communities and a concerted move towards organic pepper cultivation are welcome indication. The study team identifies the potential of value addition and future market for Wayanadan pepper. The following are the key recommendation to boost up export market for organic pepper.

1. Sterilised pepper making units
2. Weather controlled warehousing facilities
3. Grading and sorting facilities
4. Brand name for Wayanadan pepper
5. Technology transfer support for value addition and processing
6. Institutional support for cultivation and varietal development

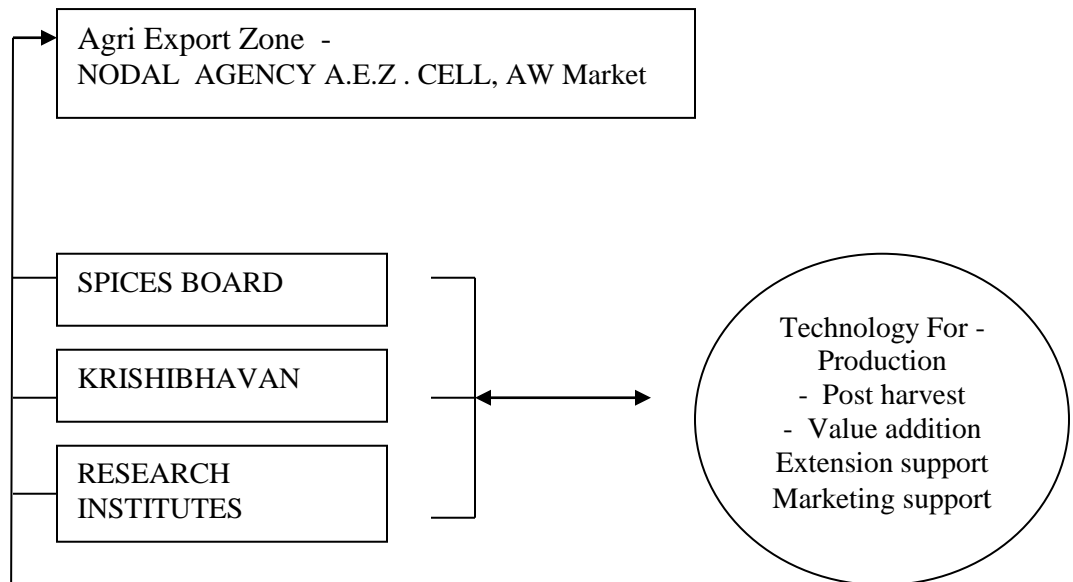


Wayand district occupies primary position in terms of area and production of coffee in Kearala. More than 80% of the total coffee produced in Wayanad is exported to various countries. Wayanadan Robusta coffee is appreciated in world market due to its inherent qualities. Most of the coffee growers are small holders who depend chiefly on coffee cultivation for their lively hood. Organic cultivation, value addition and proper marketing strategies are the major steps to increase the export potential of coffee from Wayanad. Quality assurance through standard drying yards, pulping units, storage facilities, and quality control labs is immediate measures to attract foreign orders. Branding of Wayanadan coffee is also positive step in this venture. The Coffee Board has accorded an exclusive brand –“TIGER” for Wayanadan Robusta coffee will boost the export potential of premium Wayanadan Robusta. Special emphasis needed to be given in maintaining quality system in the area of production, processing including post harvest technology and post harvest handling.

The international market for organically produced fruits and vegetables are growing in a paced manner. By ensuring organic certification we can move ahead to the export of Banaana (major producer of Nenthran), Jack fruit (Second largest producer), Ginger (largest producer) Bitter gourd, legumes and cucurbits. Standard warehousing, cool chain system, grading, packing, sanitary and phyto-sanitary testing lab etc are inevitable infrastructure required to achieve this objective.

Good network of road transport, presence of Agri Research Institutions, Natural Resource wealth, Highly responding farming communities, Financial institutions, Network of NGOs etc make Wayanad District ideal for Agri Export Zone for crops like Medicinal and Aromatic plants, Spices, Coffee and Fruits and Vegetables.

Proposed Institutional Network for effective Management of AEZ



## ANNEXURE- 1

### VALUE ADDED PRODUCTS OF PEPPER

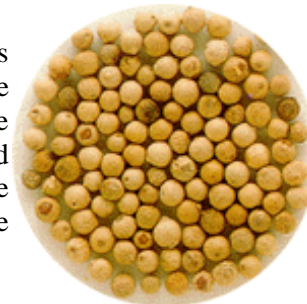
- Black Pepper
- White Pepper
- Black Pepper Sauce
- Dehydrated Green Pepper
- Freeze dried Green pepper
- Frozen Pepper
- Green Pepper Sambal Green Pepper Sauce
- Ground Black Pepper
- Ground White Pepper
- Pepper in Medicinal use
- Pepper Beancurd
- Pepper Cookies□
- Pepper in brine - cane, bottle, bulk
- Pepper Mayonnaise
- Pepper Oil
- Pepper Oleoresin
- Pepper Perfume
- Pepper Potpourri
- Pepper sweet
- Pepper Tea
- Pepper Yoghurt
- Preserved green pepper

The products developed from pepper broadly fall into three groups namely Black pepper, White pepper and Green Pepper. Black and white pepper are widely used for culinary purposes, flavouring of processed foods and for perfume and medicinal use, while green pepper is produced and marketed to specific consumers and end-users.

**Black Pepper** Black pepper, which is prepared by drying the mature green berries is a major spice with varied applications in processing industries. It is employed in a very wide range of foodstuffs, particularly in meat products. Black pepper products include Black pepper powder, Pepper oil and Pepper oleoresin. Developed countries import black pepper mostly for grinding into pepper powder. Pepper oil and oleoresin is produced in response towards the increased quality consciousness, preference for natural flavours and inconsistency in quality of raw materials. . The United States is the most important market for black pepper and black pepper product.



**White Pepper** White pepper is made from optimum ripe pepper berries by keeping it in running water for seven to nine days to soften the pericarp of the skin. The pericarp is then removed by scrubbing and the corns are washed and dried. White pepper is used for light coloured food preparations, sauces and soups. The product developed from White pepper is White pepper powder. Western European countries is the main market for white pepper.



**Green Pepper** Green Pepper is prepared from unripe developed pepper berries, which are artificially dried or preserved in the "wet" form in brine, vinegar or citric acid. Pepper corn in its natural state with its green colour and fresh green taste have always fascinated the Europeans.



■ **Canned green pepper:** The process consist of washing the separated berries or spikes, filling in cans containing dilute sodium chloride solution, with or without added acidity and sealing the cans. Cans are sterilized afterwards using autoclave and cooled in running

water. Canned green pepper is imported by Europe, the United States and Australia for flavouring and garnishing meat dishes.

■ **Green pepper in brine:** The green colour of berries is maintained by high salinity of the steeping liquid. The liquid has a minimum salt level with slight acidity to help check microbial growth. Most of the preservation in producing countries are done in large high density politeness jerry cans of 20 to 25 kg. The importing countries repack this in small glass bottles. Brazil and India are the main producers and exporters of green pepper in brine.

■ **Dehydrated green pepper:** Dehydrated green pepper has green colour and almost fresh green flavour. On dehydrated the product becomes full and soft, but does not get the texture of pepper in brine. Better dehydration is obtained by freeze drying. Frozen green pepper is made by freezing in a brass freeze. Frozen green pepper is also exported to Europe.

■ **Green Pepper Sauce** Is made from selected green pepper berries which are first ground to a puree and then blended with vinegar, salt, sugar and other ingredients. It is a uniquely piquant sauce with a natural flavour, also be used as a dip for chips or fries.

■ **Pepper Perfume :** This potpourri contains dried pepper berries, leaves, stalks and wood shavings scented with the pepper perfume "Amila" or "Sensasi". It is developed by PMB Sarawak, Malaysia

■ **Pepper Oil** Is obtained by a steam distillation process. The product is a clear, pale green liquid, Pepper oil is widely used in the fragrance industry as well as flavouring industry

■ **Pepper Cookies** A pinch of ground sarawak black pepper in the recipe gives these cookies a unique spice flavour. The cookies can be sweet or savoury

■ **Pepper Tea** Ready-to-drink (RTD) pepper has has been developed by MARDI, Malaysia using tea leaves and ground black pepper infused in boiling water, with added sugar. The product was processed either as an acidified or low acid product.

■ **Pepper Sweets** The pepper flavoured sweets have been developed and marketed by the Pepper Marketing Board. Natural Pepper oleoresin extracted from Sarawak pepper is added to the product to impart a pleasant lingering warm sensation in the throat. Pepper sweets are presently available at most of the tourist shops at Sarawak, Malaysia.

## **ANNEXURE II.**

### **Pepper in Medicinal Uses**

■ Black pepper is pungent, bitter, and destructive of worms. It is useful in cough, asthma, heart diseases, pains in various diseases of the throat and piles, urinary disorders and night blindness. It increases biliousness and brings in sleep. Yunani physicians consider black pepper as having a short, pungent and slightly bitter taste. It is carminative, aphrodisiac, purgative and antidote to poison. It is useful against toothache and inflammation and in general, pain in liver and muscles. Pepper is quite a popular remedy as an aromatic stimulant in colera, weakness following fever, giddiness and coma or loss of consciousness. It is beneficial in indigestion and in removing abdominal morbid collection of gases. Externally, its application is preferred as a rubefacient and as a reliever of sour throat, piles and some skin diseases.

■ White pepper is very useful in some eye diseases and in critical conditions of snakebite and also has an anti viral action. A notable use of white of white pepper is that is a component in a pill reputed to be specific against constant attacks of fever in elephantiasis.

■ Fresh pepper is sweet and it is good for digestion due to the enzymatic action. It is not too hot but slightly sharp.

■ Pepper powder mixed with ghee, honey and sugar taken in small doses several times a day relieves all types of coughs. Pepper powder, honey and saliva of horse, if applied on eyes, is a good remedy for hypersomnia. Application of ground pepper with other spices/medicines rectifies/relieves different ailments.

### Annexure III

## NAVARA- A TRADITIONAL RICE VARIETY WITH UNIQUE MEDICINAL QUALITIES

### Introduction

Rice-the most important food grain of the world serves the purpose of a medicine as well. This grain was the emblem of wealth and fortune for the rural and tribal subsistent farmers, and thus they had carefully conserved the diversity in it, each with remarkable qualities adapted to a multitude of complex environmental factors. Various literature shows different varieties of rice have been used in many forms against diverse ailments (Kirtikar & Basu, 1935, Bentley & Trimen 1880; Ainsle 1826; Omkar & Ghosal, 1995). Some of the Indian classic literature like Jatakas, Puranas and Ayurveda describes the medicinal properties of rice. *Pharmacopoeia of India* mentions the rice-water of any traditional variety paddy is an effective demulcent, refrigerant drink in febrile and inflammatory states of the intestine and other affections. Even today people of many rural regions in India use rice for some of their medical requirements. For example, women in Pondicherry fed with a local variety of rice called *Chengelpaatu Sirumani*-immediately after delivery to increase milk production (Omakar & Ghosal, 1995). Among the rice varieties known in Kerala there are some with the qualities of a drug that used internally in ailments like diarrhea; diseases of the urinary organs and occasionally in catarrh; also externally as an application to muscle wasting, burns and scalds. For example, *Mukkudi Kanji* -a kind of rice gruel made of a special kind of rice called *Navara* boiled in water and flavored with ginger, long pepper, fenugreek and various other medicinal herbs is considered as a diet to get immune for certain ailments during the monsoon season. This dish is specially advised during the monsoon season as monsoon often brings several ailments to common people, particularly the farming communities. *Navara* rice is known in cultivation only in the state of Kerala, and people considered it as a precious gift from God. The grains are of less aperient quality than any other grain, and is, therefore, invariably ordered as the safest food, best in the form rice gruel in all dysenteric complaints. Different kind of preparations even by the normal rice has been used as an item of diet for the sick and convalescent. Ayurveda states that the rice grains, especially of early duration varieties are acrid, sweet, oleaginous tonic, aphrodisiac, fattening, diuretic, improves taste, useful in biliousness, and relieve the thridosha- *Vata*, *Pitha*, *Kapha*. Europeans used rice for curing lung disease and spitting of blood as in pulmonary consumption. In China and Malaya specially prepared rice grains were medicinally used as a peptic carminative and tonic (Kirtikar & Basu 1935). They describe its various uses - like husk considered as anti-dysenteric by Cambodians; and roasted grains mixed with equal amount of palm sugar for *Strychnos* poisoning. However, the modern research has not given much importance to study these kind of special traits of rice grain, at least in India.

The rice varieties that are said to be with medicinal qualities are either early maturing (110- 140 days) or very early maturing (90 days and less) and known from many parts of rice growing regions. In Kerala, for example, *Navara*, *Chennellu*, *Erumakkari*, *Kazhungum* puthada, Karutha chembavu, and *Kunji Nellu* are few of this kind cultivated entirely for this purpose in the state. However, only *Navara* and *Chennellu* are widely known among the traditional healers, where the former one is used more commonly for external medicinal application in the form of a *kizhi* (material taken in a cloth and tied-up in the form of a small bag) or as a paste. The latter used only as a food during sick conditions. *Navara* is an early duration variety with about 60- 90 days cultivated throughout the state but in restricted agro -climatic zones whereas *Chennellu* is a medium duration one with 120 to 140 days confined to northern parts of the state. These two varieties as in case of many other traditional rice grains are with different ecotypes distinguished by the duration of maturity of grains, colour and form of the glumes.

This report is the result of a survey made in different paddy grown areas of Kerala for a period of six months to identify and collect diverse strains of *Navara* and other rice varieties with medicinal qualities. The objectives included, gathering information on their yield potential and disease resistance properties; and promoting *in-situ* onfarm conservation of its different strains. Authors made personal interviews with many farmers, traditional healers, ayurvedic physicians and referred to all the currently available information in classic texts in Ayurveda as well as in general publications for writing this report. The Study shows *Navara* is a rice variety that once widely cultivated, but now being restricted to central and northern parts of Kerala. It also revealed that it is rare kind of rice, which possesses very valuable traits that might lead to developing it as a unique variety among all the cultivated rice. Seed samples of different varieties of *Navara* were collected from 38 localities during this study. This study recommends wider cultivation of farmer selected improved variety of this grain with effective participation of scientists, physicians and market personnel. Also it suggests a detailed bio-molecular analysis of various ecotypes of the grain to understand the medicinal properties at genetic level.

The paper is structured as follows: section one examines the value of *Navara*, as a medicinal rice. Section two discusses the cultivation practices of this variety, and Section three focuses on the issues in conserving *Navara*, and other traditional paddy varieties of Kerala.

### **Navara- a unique rice variety of the tropics**

**Etymology:** The name- *Navara* and the Sanskrit name for wild rice *Nivara* are closely resembles each other. Also the Telugu name for wild rice *Nevari or nevari dhanya* is directly traceable to the Sanskrit name *Nivara*. Our observations show the grains of *Navara*, like its wild relatives present here (*Oryza rufipogon & O. fatua*) are early maturing and very shattering types. All these varieties are employed in local medicine system. It may be of worth to study the origin of these names and their relationships, which might give light to the evolution of cultivated rice from its wild forms. Authors could not trace out these aspects and also details like since when the name *Navara* has been in use. *Navara* is being called by at least seven different but closely resembled names in different regions of the state (See box 1).

**Morphology:** *Navara* is in the group of very early maturing type of rice (some farmers have claimed it can be harvested within 57<sup>th</sup> day, if it is in the proper field and there is no fault in cultural practices). Indeed, it used to be harvested within a span of 60 days. However, in no case its duration will exceed 90 days. There are two clearly distinguished ecotypes existing in this variety- one with black glumes and other with golden-yellow glumes. Within the ecotype there are two different forms - one with awn and another without awn. Thus, in this variety there exist four morphologically distinguishable strains, but adapted to same kind of agro-ecological conditions. Plant generally grows up to 1 m tall. Morphology of this is as like that of typical *Oryza sativa* plant, but with very weak tillers, spreading and lax panicle; purple or golden yellow spikelets with or without awned glumes. Grains narrowly ellipsoid, small, slender, light in weight with red kernel (see box I)

#### Box I. *Navara*- Varietal Information

Botanical Name: *Oryza sativa* Linnaeus

Local Names: Navara; Navira; Njavara; Njavira; Nakara; Namara; Nakara Puncta

Sanskrit: Sashtika Sali (sashtikam= 60 days; sali = with white kernel?).

#### Description

Erect annual grass with slender stems; inter nodes longer, weak, grows up to 1 m tall. Roots tufted, fibrous, with dense rootlets, hairy, shallowly penetrating; embryonic -roots thin, short living. Tillers - primary, secondary and tertiary, 12- 15, very weak. Stem with nodes and inter nodes, cylindrical, c. 3mm wide; leaf sheath green; flag leaf intermediate. Leaves auricled, ligulate, simple, linear, 25-40 cm by 10 - 15 mm, base sheathing, margin

scaberulous, nerves many, thin pubescent, apex acute, membranous to chartaceous, green to dark green. Inflorescence a terminal panicle, spreading, lax, moderately well exerted, upto 25 cm long. Flowers (spikelets) 60- 100, highly fertile (>90%) early maturing, distant, lemma and palea golden yellow or dark purple to smoky black, with or without awns, smooth or slightly scaberulous; awns slender, brown or golden; shattering moderately high, easy threshability; stigma light green or light purple; lemma and palea glabrous or slightly pubescent. Grains narrowly ellipsoid to oblong, light in weight, slender, 7 to 8.5 mm long; 4.5-4.8 mm wide; seed coat pale purple; endosperm slightly glutinous, non-scented.

### ***Medicinal Qualities of Navara***

All the paddy varieties could be put into two groups, according to Ayurveda. One is with red kernel, which is called as *Vrihi*, and the other group with white kernels as *Sali*. Eating quality of grain is more in *Sali* type than the *Vrihi*. The text - *Ashtangahridaya* also notices *Sashtiko Vrihishu Sreshto: Guaraschithagauratha*: which meant the rice that matures in 60 days is excellent among the *Vrihi* group of grains, it is acrid, oleaginous and sweet. It continues by stating that the rice grown in upland conditions will be more nutritious than that grown in lowland fields. If this statement is taken into account all the rice varieties that maturing within 60 days, and suitable for growing in uplands could be medicinally useful. Physicians of Kerala believe the *Sashtika Sali* refers *Navara*, but, interestingly all the four strains of *Navara* known from Kerala are with red kernels.

### ***Navara in Local Health Care Systems***

*Navara* is like gold having aroma, very precious grain for the farmers. It is literally like gold for them, readily marketable at any season. Therefore, they conserve it with great sanctity and care, though the grain yield is low. Among the two strains, the black coloured strain without awn is the genuine strain and considered to be medicinally more useful according to the farmers and healers of Calicut, Kannur and Malappuram districts in northern part of Kerala. Whereas for the farmers of Thrissur and Palghat region, the black glumed with awns are the real *Navara*. Invariably all the farmers there harvest it exactly within 60 days. In south and central Kerala but farmers do not even know there is a strain of *Navara* with black glumes. There is the slender, golden- glumed beautiful grain without awn. Still farther, towards south the farmers and healers cultivate and use the golden -glumed- awned type. Yet both are being used in local health care systems as well as in Ayurveda for many of the ailments. It is employed in treating mainly rheumatic pains and associated diseases. It may be noted that *Navara* was never been in use as a food grain by the farmers of this region, and because of this reason there were no large- scale cultivation. They considered it as a non- food grain (rice is slightly sour in taste) used only during the time of bad weather seasons like monsoon to improve resistance. It is recommended to feed the newborn babies in the form of dish- '*angri*' made of *navara* flour and dried powder made out of a banana variety called 'kunnan' much before their first feeding ritual. This rice is said to be very nutritious, balanced and safe food for babies. It is recommended for consumption for the people of all ages to increase the vitality, and as a natural energiser. Once the rich families preferred this rice only for their daily consumption. These days too those who are knowledgeable about the qualities of this and can afford its price are consuming it as a chief food grain. The rice is better when it is used always in raw. But recommended to use boiled rice, however boiling should be in a different way particularly when it for consumption (see Box II).

#### **Box II: Boiling methods of Navara**

Water is to be boiled first in a big copper vessel which is with small mouth; put the grains into it, only after taking out the vessel from the fireside. Keep the vessel tightly closed for about four hours away from the fire place; then have it open for another one or two hours. After pouring out all the water in the vessel, dry the grains in shade,



which is exposed to gentle wind. Following this, dry it again in partial sunlight to keep the grains slightly warm. These grains then hold back in the shade for cooling. Use locally made wooden or stone grinder for milling to avoid excessive polishing of the grains. Better do not keep it in the form of rice for a prolonged period of time. Medicinal quality is said to have increased when kept it in the form of grains for a long period of time.

Rice gruel made of *Navara* along with few spices like fenugreek and medicinal herbs such as mukkuṭṭi (*Biophytum reinwardtii*), kadaladi (*Achyranthes aspera*), karuka (*Cynodon dactylon*), vishnukranti (*Evolvulus alsinoides*), valli uzhinja (*Cardiospermum halica-cabum*), nilappana (*Curculigo orchioides*) during the monsoon season is considered as best resistant to various diseases. A wide range of local uses of this grain is given in the box III.

#### Box III. Local Uses of Navara

- Regular consumption of *Paal Kanji* for one time a day (Rice gruel made in cow's milk added with sugar) ensures longevity. It is believed that this was the food of those holy leaders of ancient India.
- Consuming this rice that boiled in some vessel made of copper prevents rheumatic complaints and give exceptionally high energy.
- For acute complaints of *piles*, consume the rice that roasted along with small onion in cows gee for 21 days in empty stomach. (Cook the rice separately in clay pots and then roast it with onion). Another method is consume the cooked rice mixed with curry leaf, sour butter- milk and pepper.
- Roots are employed in the form of decoction is useful in urinary complaints of children.
- Eating of Navara rice *flakes*, pounded with roots of Aswagandha and sugar will increase vitality and body weight and acts as an aphrodisiac. Recommended for young couples.
- Regular consumption of this rice surely increases body weight.
- Consuming Payasam - a sweet dish made of this rice in jaggery and gee increases mother's milk.
- For burning sensation of foot apply warm rice paste for one or two times for a week's time.
- Consumption of *Mukkudi Kanji* or *Marunnu Kanji*- form gruel along with several other medicinal herbs prevents ailments that common in monsoon season. Recommended for all especially women and children.
- Rice flour (one or two table- spoonful) in one glass of milk before go to bed gives the effect of an aphrodisiac.
- Navara rice is recommended for diabetic patients.
- Malar - a specially roasted form of rice that wet in water or basil juice is good for dysentery.
- For small burns and cuts apply the ash made from Navara husk. Quick healing!
- Navara rice is the safe food for snake bitten patients.
- Applying rice paste in the pustules formed due to the biting of Viper reduces pain.
- For stomach ulcer consume regularly a dish made of navara rice flour along with that of banana for three months.
- For premature falling of hair, cleansing head regularly with washed away water of Navara is useful.
- For cough, boil the navara rice along with *Moringa* leaf, pound it and take with the flakes made of navara.
- Eat regularly the bran of Navara mixed with jaggery to recover from peptic ulcer. It also said to be ideal for anemic patients.
- Eating navara rice increases semen and fertility in males. Recommended for childless couple.
- For swellings in foot apply warm navara rice paste.
- For growing babies, right from its six months onwards the dish made out of flour of Navara and Kunnan Vazha is invariably recommended by mothers.
- Regular application of a special rub prepared in coconut and gingelly oil mixed together along with pounded navara grain, herbals like *piper longum* boiled in equal quantity of milk from cow, and buffalo relieves polio in children.

#### *Navara in Ayurveda*

Ayurveda when it refers about rice postulates *Sashtiko: vrihishu: sreshtaha:*, which means among the vrihi kind of grains that matures within 60 days (shashtikam refers 60 days, vrihi= rice with red kernel, sreshtam= superior, excellent) is superb for meeting the medicinal requirements. This implies all the rice varieties that mature within 60 days have medicinal qualities. There are references in texts of Ayurveda about other rice types that are with fewer qualities than Sashtika sali. However, only navara is being used from time immemorial in ayurveda. The ayurvedic physicians of this state believe Sashtika Sali is Navara, and attribute its medicinal quality to its less starch and high protein contents. Some of them believe that this is the grain that suggested by saint Yavana in Hindu beliefs for keeping youngness and longevity. Navara rice is of with *Brihmana* quality, which increases the growth of muscles and stimulates the nerve endings. The grains with the quality "brihadam", which silence rheumatism are sweet, acrid, oleagenous, aphrodisiac, diuretic, carminative, antidysenteric and tonic (Warrier *et. al* 1996). It is used mainly in disorders like Muscle wasting and Cervic spondilitis. The roots of this rice is said to be cooling, diuretic, febrifuge, and are useful in burning sensation, dipsia, bilious fever; strangury and diabetes. Navara is usually used for external application in process - *navarakkizhi*, a type of "warm sweating" treatment and *Navara thaepu* - applying the body with hot navara rice. An oil prepared out of navara bran named *Sashtika thailam* is recommended in all nervous diseases, body ache, numbness, spondilitis, wasted muscles due to poly myletes, myopathies, and motor neuron diseases. These methods are to remove all the wasted material from the body and thus clean and rejuvenate it.

### ***Navarakkizhi***

*Navarakkizhi* is a kind of *Pinda Svedam* - a warm sweating process of human body using rice grains and other medicinal herbs. It is a very popular treatment in Kerala in *pancha karma chikilza*, which keep the three causes of all illness – *vatha*, (air) *pitha* (biliousness), *kapha*, (phlegm) in equilibrium. *Svedam* is described in Caraka Samhita and Suhrutha Samhitha in four different ways- *Thaapasvedam* (sweating by heat), *upanahasvedam* (sweating by using paste of herbs covered completely the body to raise heat), *ooshmasvedam* (sweating by steam) and *dravya svedam* (sweating by using boiled water). *Pinda Svedam* is a kind of *ooshmasvedam* where the sweating of body is by warm navara rice, boiled in milk poured in the decoction of roots of Kurumthotti (*Sida rhombifolia*, var. *retusa*). This method is the contribution of Kerala to Ayurveda. This treatment- a rejuvenation therapy is said to be very effective in certain kind of rheumatic complaints, emassiative conditions, nerve failures, weakening of muscle fibres, and diseases of the limb due to unknown reasons.

The season for this treatment is Karikidakam - the monsoon time, and Tulam and Vrichikam - the coolest months. The treatment is a kind of massaging the entire body of the patient from below the neck portion using *kizhi* which contain the boiled rice for about 45 minutes. Prior to this the patient has to apply some oil preferably the *sashtika thailam* or dhanvandari thailam/prabhanjanam or Aswagandhadi (physicians will decide) allover the body for about 45 minutes. Normally one course of the treatment is 14 days, but it can be for 7 days and continues for 21, 28 and likewise up to 48 days for a season according to the fitness of patients. Following are the material and workmen needed for the treatment for one course (14 days) of the treatment.

1. Dhara Pathi (A wooden plank made of wood from some specially recommended trees\*)=one
2. Wide mouthed vessel made of copper = one
3. Plates = two
4. Fire place or oven
5. Navara Rice= 3.5 idangazhi (about 5kg)
6. Kurumthotti Roots= 15 kg

7. Milk= 14 litre
8. Rasnadi powder= 3 or 4 packets
9. Goosberry = 28 numbers
10. Dried spathe of coconut= 301 numbers
11. Good (well) water = sufficient quantity
12. Cotton cloth of 1sq. ft size= 112 pieces (8 piece for one day)
13. Cotton string = 112 pieces (8 piece for one day)
14. Working men = five

Decoctions of *Sida* only prefers for boiling the rice, but in certain cases, based on the type of sickness, decoction of other leaves are also will be considered along with this. Like wise along with Navara, grains of wheat, black gram, fenugreek, horse gram, and mustard are also used in certain ailments.

The methodology of treatment is something like as follows: Take about 10 litre decoction that prepared out of 1 kg of *Sida* roots in 40 litres of water. Pour equal quantity of milk into this, boil it for few minutes, and add into this about 250-300 gm of raw navara rice; cook till it become a glutinous mass. In the meantime in another vessel keep ready the decoction of *Sida* in boiling milk. Then take sufficient quantity of cooked rice paste in the cotton piece meant for this and makes it in the form of a *kizhi*. *Kizhi* is a piece of cloth containing some material tied up in the form of a globose bag like structure, tied up loosely. By the time the patient should be ready and lay down on *Paathy*- the wooden plank, which kept at breast height. Four experienced nursing assistants standing two each on either side of the patient then start massaging the patient from neck to bottom both on front side and back side alternatively using the warm *kizhi*. Simultaneously another person should warm the other four *kizhis* in boiling *Sida* decoction. The process of massage should be very gentle without much pressure on the patient's body. The process should be quick when the *kizhi* is hot and slow when it is not. Continue it for about 45 minutes. Wipe out the paste stuck on the body of the patient after the massage is over by using a fairly long green leaf of coconut palm, which is stiff with fine edges. Patient has to apply once again slightly warm oil allover the body, wait for about 10 minutes, and take head bath first in water that kept overnight soaked with 2 or 3 gooseberries. Followed with this take body bath in warm water. Use flour of green gram or coconut cakes to rub off the oil. The entire process ends with applying the *rasnadi* powder on head of the patient.

### ***Navara thaeppu***

It is another kind of application of this rice in the form of warm paste on the body of patients for a period of one or two hours. This method is suggested for the patients who are very weak not able to exposed for navarakkizhi. This is also said to be effective for many of the troubles listed above. Navara rice has to be prepared as described for the *kizhi* in decoction of *Sida* or some other material (it varies according to the disease and the physical and physiological nature of the patient). This treatment is highly recommended for patients suffering from Tuberculosis.

Table I: Trees recommended for making the "Paathi"(Fibre *Paathis* are in use these days)

Local Name	Botanical Name	Remarks
1. Athi	<i>Ficus racemosa</i>	Common tree, in wild, Medicinal
2. Champakam	<i>Michelia champaca</i>	Less common tree, cultivated, Medicinal
3. Chandanam	<i>Santalum album</i>	Rare tree, purely wild, Medicinal
4. Devadaru	<i>Cedrus deodara</i>	Famous tree. Distributed only in Himalayas
5. Ithi	<i>Ficus retusa</i>	Common tree, cultivated, Medicinal
6. Kanjiram	<i>Strychnos nux-vomica</i>	Common tree, wild in homesteads, Medicinal

7. Karingali	<i>Acacia catechu</i>	Common in scrub Jungle, Medicinal
8. Koovalam	<i>Aegle marmelos</i>	Common in households, Medicinal
9. Kumizhu	<i>Gmelina arborea</i>	Rare tree, only in wild, Medicinal
10. Maavu	<i>Mangifera indica</i>	Commonly cultivated in homesteads
11. Neer maruthu	<i>Terminalia arjuna</i>	Rare tree, highly medicinal, rheophytic.
12. Neer Mathalam	<i>Crateva magna</i>	Rare tree, highly medicinal, only in wild, rheophytic.
13. Paathiri	<i>Stereospermum personnatum</i>	Less common tree, Medicinal
14. Peral	<i>Ficus bengalensis</i>	Cultivated, sacred tree
15. Punna	<i>Calophyllum inophyllum</i>	Coastal tree. Common, Medicinal
16. Puzha Vanchi	<i>Nauclea missionis</i>	Endangered tree, rheophytic, , Medicinal
17. Varikka Plavu	<i>Artocarpus integrifolia</i>	Commonly cultivated
18. Venga	<i>Pterocarpus marsupium</i>	Less common, in wild, Medicinal
19. Veppu	<i>Azadirachta indica</i>	Cultivated in homesteads

Note\*: A number of trees are recommended for making the Dhara Pathi (See table I) + Milk from a black cow of local breed is recommended. In Kasaragode area for better results physicians recommend milk from a local breed of Cow called "*Maanichi Pasu*", whose body and eyes are grey- coloured, and with copper coloured tail tip

## Navara Cultivation-Operational Procedures

### Seasons and Landtypes

Traditionally cultivation of rice coincides with the bimodal rainfall in the state- the Southwest Monsoon during the months of June to August (September) and the Northeast Monsoon during the months of October to December. Generally three seasons for rice cultivation are here- virippu (kharif/autumn) the first crop, mundukan (rabi/winter) the second crop and Puncha (summer) the third crop. Of the three seasons puncha is the shortest with three months duration where the cultivation starts on (December) January and ends with (March) April. It is essentially an irrigated season where bright sunshine is available for the crop throughout the season. Navara, normally sown in this season in uplands, which gives maximum yield, though this is considered as a season less variety that can be cultivated in any of the seasons. As it is a short duration crop, it is more suitable for upland conditions. It is also adapted to well- drained soils, which never suffer from oxygen deficit or reducing conditions.

Geographically Kerala is divided into 3 zones- coastal plains, midlands and highranges. Based on the topography, soil and other biotic and abiotic factors the rice cultivated regions have distinguished into 8 agro ecosystem zones spread in these three zones, viz.; kuttanadu zone, onattukara zone, pokkali zone, laterite midlands, malayoram zone, palakkattu plains, Black soil zone and high ranges. Among these the navara cultivation is restricted in primarily three zones - laterite midlands, onattukara zone, and malayoram zone (see map). In the high ranges of the state, only in Wayanad it has been cultivated. Traditionally the Vayal (paddy field) is distinguished into three types, 1. *Padom* (Vayal/ Nilom or kundu padom, kundu vayal), which is the lowest part in the toposequence, 2. *Palliyal* (Kunivayal) -the middle in the sequence, and 3. *Modan* -the upland portion. The Modan and upper portions of Palliyal areas are purely rainfed. The varieties cultivated here were largely some specialty rice like Navara, Karutha

Chembavu, Naron (in Kasaragode area this is used as a substitute for Navara), Modan, Vadakkan etc.; Normally these varieties are low yielding with poor eating quality, but said to be nutritionally better than those of grown in bottomlands. Padoms or Nilom is the largest area available for cultivation of rice. Depending upon the season there are generally three kinds of Niloms- double cropped paddy lands or *iruppu niloms*; *oruppu nilom* if it is only one cropped and *muprove niloms*, if triple cropped. Short duration traditional varieties like Navara, and Thonnuran, HYVs like Triveni, Rohini, Jyothi, Kanchana, Swarnaprabha etc. are grown in moopove niloms. Thus, Navara could be grown in the lowest field also, but then quality wise it will be poorer than those cultivated in uplands.

### ***Seeding Methods***

Direct seeding in puddled soil is followed in Navara. The seeds are slender, smooth, and weightless with red kernel. Select uniformly heavy seeds for cultivation. The seeds are normally dormant for only a short period of time - 6- (8) months, according to experienced farmers. For that reason alone certain farmers cultivate this variety round the year to conserve the seeds. The most suitable field for its cultivation is of those of slightly raised lands (lowest portion of the Palliyal) that are away from the main paddy grown fields. In almost all cases direct seeding by broadcast in wet field is practiced. The explanation for this is navara is an exceptionally very early duration rice type and its tillering ability is limited. However, certain farmers also practice transplanting, for example in Wayanad depending upon the season and the prevailing situations. But transplanting requires much labour input and also slower than direct seeding. Moreover, Navara variety is a best competent one over many of the common weeds, because of its quick growing habit and tall size. Thus, in a constantly Navara growing field weeds are minimum. It also has got well -developed root- system, which moderately tolerant to drought. As a short duration type this is photo insensitive and can be grown in all the three seasons- *virippu*, *mundukan* and *puncha*. In puncha season this will be grown in nilom or vayal whereas in the other seasons it will be grown only in Mayal- (the place distinguished between Palliyal and Nilom) areas because water is needed only in the initial period of 2-3 weeks. The field will be kept open till the next season to maintain the purity of the grains in Navara by avoiding mixing up of other voluntary grains in its fields. Knowledgeable farmers and the traditional healers will strictly follow this practice. As it is grown in elevated fields that are normally away from the common paddy fields the chances of falling of volunteer seedlings from shattered grains of other varieties is very minimum. The advantage of cultivating *Navara* in raised field reduces the chance of being subjected to strong wind. When it is cultivate in bottomland (nilom) repeated harrowing has to be done to destroy all the field vegetation.

### ***Seed Germinating Method***

Seeds have to be sufficiently soaked for hastening the germination. Seeds to be dried once again just before soaking. It is believed soaking would destroy the seed borne- diseases as well. Traditional farmers consider some auspicious days like *Thiruvathira*, *Uthrittathi* for this purpose as they believe that will give good yield. Seeds are taken in gunny bags made of either jute or plastic which tied-up loosely and kept it completely immersed in a vessel containing water or in some water passage or tank during evening time. It is better to mix up the water with little cow-dung or ash. The seeds are to be soaked overnight, usually for 12 hrs. It varies in different regions, in certain cases it is upto 24 hrs. The dormancy period and dryness of the seeds also will be taken into consideration for deciding the time span for soaking. Next day the seeds are taken out from the bag and heaped on a specially prepared ground arranged with fresh leaves of Banana or wild Maranta (*Schumannianthus virgatus*) as a lining material on the floor in a partially shaded area that bordered with banana trunk or areca planks. The entire seed bulk is to be well covered, but loosely, preferably with paddy straw, wet sacks or fresh banana leaves, and keep some hard weight over it to give maximum humidity inside. Water is to be

sprinkled on the seed mass for three times, in the morning, noon and evening after stirred it occasionally. Seeds will be sprouted within 3<sup>rd</sup> or 4<sup>th</sup> day, depends upon the quality of the seeds. If it is not germinating even after 4<sup>th</sup> day spray the mass with finely powdered cow-dung in water. If the seeds are seems to be less viable due to its oldness or over drying, soak it in slightly warm water, dry it again in sunlight to make the seeds new and follow the usual procedure. Soon the seeds complete the germination (when the radicle just showing out) take small quantities of it in a specially made winnow and sow it during morning time. Experienced male members of the family do this in a gently puddled field.

### ***Preparation of the Field***

Land should be with less water that thoroughly ploughed and puddled. The number of ploughing depends upon factors like nature of the soil and the kinds of ploughs and implements employed. Generally 3-4 times are ploughed using bullocks or tractor. Farmers invariably prefer to plough with cattle, but it is not affordable these days due to high wage and rarity of this system. Sufficient quantities of green manure have to be ploughed with the land. For this purpose farmers used to conserve bushes and small thickets in a portion of their own land or in waysides called *Pachilakkadu* (green groves). One can see several such kinds of 'groves' in Calicut region endowed with many useful trees that are used for green manure and various other purposes (see table I). Apply dried and powdered cow dung at the rate of 30 basketful (about 300 kg) and 8-10-basketful plant ash for an acre while during the last ploughing. After the harrowing, puddle the land very gently so as to make the field leveled, smooth and also to drain off the excessive water and, settle it to until the mud is cohesive. Then make canals of 10-15 m intervals to drain all the excessive water, but keep a thin film of water (1or 2 cm) to avoid the sinking of seeds in the mud while sowing.

The selection of seed should take into consideration of a number of facts such as the method of cultivation (whether by direct seeding or by transplanting) land type and the season. If it is meant for direct seeding in nilom, it should be ensured that the seeds are not more than 6 months old and pure without any mixture. About 50-60 kg of seeds are required for an acre, if it is direct seeding. In the case of transplanting 35-50 kg only is needed (transplanting not generally followed at all). Farmers believe broadcasting sprouted seeds is as good as transplanting. *Navara* has an optimum period for sowing that ranges 7-10 days. If the seeds are sown in the correct date the yield will be the best. Farmers' experience shows the yield will be more, if seeds are sown in "*Makiram njattuvela*".

### ***Cultural operations***

The important management practices needed after the seedlings are successfully grown are water management, application of manure and the management of pests and diseases. In *Navara*, management of water is the most important operation. Maintain the water level during day -time at about (1) 2-3 cm until the fifth leaf has come out. Thereafter, increase it about 5 cm until maximum tillering stage, which comes between 20-25 days. After that there is no much water is needed. Farmers are practicing of keeping the water at this level during daytime only till the flowering and grain formation stages. The water is completely drained out just one week before harvest.

### ***Manures and fertilisers***

No heavy manuring should be done, as the plants are very weak to stand upright if the panicle weight is more. Farmers invariably use only organic manure like green leaf manure, farmyard manure and compost. This is done at the time of ploughing as a base -manure. They add small quantities of phosphatic fertilizers at two times depending upon the land nature one at the heading stage and another in the seed ripening phase.

## Diseases and Pests

Diseases and pests in general are not severe at all. There is no record of any serious damage to the crop due to these reasons. However, in certain season occurrence of blast disease and stem rot are reported. Among the pests, stem borers leaf rollers cause damage, especially when try to cultivate double crop in *orupu* niloms. Application of BHC is said to be effective against the borer. Paddy bugs like gundhi bugs are causing damage during the grain formation stage. Non insect pests like rodents, crabs, and parrots cause menace in certain occasions. Damage caused by parrots is reported in first and second crops. It will be more in I crop (Kanni crop) and less in IInd crop (Makara crop). No record of its attack in Puncha season. There is a folk melody among the villagers in Calicut- "*Kanniyilae nellu thathentae achentae, Makarathilae nellu thathentae amnavantae*, meant that the grains during Kanni season are of parrots' father and that of Makaram season of it's uncle, hinting that parrot has every right over the property when it is its father's and it is less when it is of uncle's. Attack of insect pest like saw-toothed beetle is reported in stored grains. There are several indigenous ways for managing the insects and pests, like keeping leaves of *Ginger, Glycosmis, Neem* etc, as a lining material in the seed container.

Table II Trees used for Green Manuring

Local Name	Botanical Name	Remarks
1. Cheru	<i>Holigarna arnottiana</i>	Laticiferous, coriaceous leaves. Medicinally important tree. Said to control harmful soil microbes and insects Common in sacred groves as well.
2. Kanjiram	<i>Strychnos nux-vomica</i>	Highly valuable tree for medicinal purpose as well. Used to be seen in every household in northern Kerala.
3. Konna	<i>Glyricidia glabra</i>	The common leguminous shrub for live -fence. Excellent green manure, with thin leaves.
4. Maavu (local variety)	<i>Mangifera indica</i>	Once there were a multitude of local varieties were present in this species invariably in all homes of Kerala. Many a varieties are locally extinct. Laticiferous. Said to control harmful soil microbes and insects.
5. Maruthu	<i>Terminalia paniculata</i>	Common tree with thin-coriaceous leaves. Medicinally useful.
6. Nelli	<i>Phyllanthus emblica</i>	The Gooseberry. Very important tree. Fast disappearing from households. Control growth of weeds.
7. Njara	<i>Syzygium caryophyllaeum</i>	Once common near running fresh watercourses. Leaves thick.
8. Peralu	<i>Ficus bengalensis</i>	The banayan tree. Sacred, give shelter to many birds and epiphytic herbs.
9. Pezhu	<i>Careya arborea</i>	A highly useful tree for cattle disease as well. Excellent green manure. Said to control harmful soil microbes and insects.
10. Plavu	<i>Artocarpus hirsutus</i>	The jack tree. A tree that is part and parcel of every Keralite.
11. Thekku	<i>Tectona grandis</i>	Highly valuable timber -yielding tree. Leaves very broad, coriaceous. Tender leaves and inflorescence medicinally employed against soriasis. Control growth of weeds.
12. Ungu (Pongu)	<i>Pongamia pinnata</i>	Very useful leguminous tree for Ayurvedic and local system of medicine. Said to control harmful soil microbes and insects. Control growth of weeds.
13. Vaaka	<i>Albizia lebeck</i>	A leguminous elegant tree. Useful in local usage of medicines.
14. Vatta	<i>Macaranga peltata</i>	Common tree in every households. Many local uses for this tree.
15. Venga	<i>Pterocarpus marsupium</i>	A large leguminous tree. Rare in distribution; highly laticiferous. Latex and wood are medicinal. Said to control harmful soil microbes and insects.

### ***Harvesting and Threshing***

Navara can be harvested one month after full flowering when the grains reach uniform ripening. Normally it takes 75 days. Yield is poor. In general, it is at the ratio of 1: 10, but varies considerably up to 1:30. Usually an average of 1 tone from an acre is obtained. It responds to fertilizers well and produce high yields but lodges heavily. Thus no experienced farmers go for heavy manuring. Good quality seeds, proficient farm management, judicious use of fertilizers ensure moderately good yield. Though the yield is poor, it is compensated with the prize of the grains, which consistently 3-4 times than ordinary paddy. The current market value of 1kg Navara seed is Rs. 25 to 40, whereas the others cost only 6-8 rupees. Regardless of the high market value Navara is not at all widely cultivated. There are four major reasons for this plight. The foremost is, Navara is cultivated only for medicinal requirement not for consumption (it does not considered as a food crop). Secondly, pharmaceutical demand is taken care by whatever paddy grain available in the name of navara. (This study revealed that there are many varieties look similar to navara is being sold in its name). Thirdly, the yield is very poor when compared to other paddy varieties. Another important reason is Navara cultivation requires special kind of paddy fields and much care in maintaining the purity and quality of the grains.

As the grains are shattering type, threshing should immediately done. Generally women are employed in harvesting and threshing. Most commonly threshing is by beating the sheaves against a hard surface. In olden days cattle treaded the sheaves. Though this practice was very effective in removing all the grains and softening the straw, it is disappeared from almost all the regions. These days tractors hired have been used for this purpose, if the harvest is more. For *Navara*, but the cattle treading is recommended for threshing. After the treading the grains are winnowed to remove the chaff. The heavy grains will be gathered by frequently pouring the grains out of a basket by letting the wind blow of the chaff, dust and lighter grains. Navara straw is thin and soft therefore, a cattle like it very much.

### ***Seed Storage***

As the dormancy period of the seed is very short the storage of seed requires care. The seeds have to be selected within two days of the harvest. The bold and heavy grains are selected through winnowing the grains against wind direction and dried in day and night continuously for four to seven days. Breaking the seed into two halves to see a thin white line in the centre tests the optimum drying. Seeds are normally stored in jute gunny bags and kept above some wooden platform like structure that exposed to the smoke from kitchen. Grains for seed purpose generally do not store in wooden boxes for a long period of time.

Table III. Medicinal Rice Varieties of Kerala (All are very rare in cultivation)

<i>Name</i>	<i>Durati on</i>	<i>Place of Cultivation</i>	<i>Remarks</i>
1. Erumakkari	120-130 days	Ernakulam-Thrissur	Upland rice. Used to cultivate in coconut gardens.
2. Jaatthi Suggi	120 days	Kasaragode-Karnaka border	II season crop. Highly preferred variety for consumption as well as medicinal purposes.
3. Jeeraka Chembavu	120 days	Thiruvananthapuram	Very small and slender grains; kernel white. Highly preferred for consumption.
4. Kamaal	120 days	Kannur	Crop of I season (virippu). Cultivate only for medicinal requirements.
5. Karutha	120	Thiruvananthapuram	Entire grain is black in colour, including husk,



Chembavu	days		bran and kernel. Use in place of Navara
6. Kolaran	85-90	Kasaragode	Dark purple grains. Use in place of Navara if it is not available.
7. Kunji Nello	120 days	Kannur	Upland rice; scented, highly preferred for consumption especially during sick condition.
8. Nalla Chennellu	120 days	Kannur	Kernel red. Rice flakes are medicinal
9. Naron	60 days	Kannur	Upland rice. Use in place of Navara.
10. Navara (purple & golden)	60-90 days	In plains and midlands of Kerala	All season crop. Upland and medium -lowland. Widely known as medicinal. Employed in Ayurveda.
11. Vadakkan	85-90 days	Kannur	Upland rice. Grains purple.
12. Vatton (purple & golden)	90 days	Thrissur, Palghat and Malappuram	Very similar to Navara but grains are slightly bolder. Use in place of Navara.

Source: Sujith Kumar 1999 (in part) and Personal observations

### ***What makes Navara medicinal?***

Navara is not the only variety with medicinal qualities known in Kerala (See Table III). Still there is no other variety with that much quality to compete with this grain. There are few reports to show that this variety possesses some characteristic amino acids (Menon & Potty 1995, 1997, 1998). They have attempted to understand the amino acid composition in the two known strains. It shows that total free amino acid composition in these strains are more when compared to other high yielding varieties? They reported that the amino acid content varies under different agro-ecological conditions. According to them the *methionine* might be the responsible active compound for the medicinal quality. Methioine is the only common amino acid with ether linkage and is important donor of active methyl groups. However, there are no solid studies to explain the medicinal properties of this rice. Studies are to be undertaken to prove by example what exactly the medicinal component, whether or not the medicinal property and sourness of the rice are related, how the yield character and medicinal properties are linked, what are the different vitamins present, how the concerned genes functions and so on. Sincere efforts have to be there to unveil the secret of this noble rice variety without any delay. There are about 38 different samples on Navara collected from different agroecological zones during the study (Table IV). Initial screening of *Navara* done by the Community Agrobiodiversity Centre with the help of Indian Institute of Spice Research shows the accessions of Navara from Thrissur side and Kozhikkode are promising (Results to be published). Unfortunately, both the strains are being cultivated in restricted ranges in the state. Scientists at Community Agrobiodiversity Centre have taken interest in protecting these strains by encouraging farmers of Wayanad for its wider cultivation.

### ***Issues in Conserving Navara and other Paddy Varieties***

The word Rice was synonymous to food for the people of this state, which earned the name "rice eaters" for eralites. People worshipped this *Dhanya* and considered it was God given to support and nourish the mankind. Over a period of time the "breeders" among them have prudently selected and conserved many unique varieties primarily based on their qualities. But these varieties being tall and being liable to lodging especially under high level of fertilization, are not amenable for intensive method of cultivation for achieving higher production and productivity (Nair et. al 1999).

The infra-specific variability in the rice (*Oryza sativa*) was enormous in Kerala too till the recent past. The peasants of this State had adopted various farming techniques that are eco-friendly and sustainable to protect these varieties. A number of varieties of that kind have been collected during this study (Annex I). The Kerala State has lost nearly about 50% of its paddy fields within a span of 40 years. In 1975-76 area under rice accounted for 30% of the gross cropped area, it declined to 24 % in 1985-86 and to just 15% in 1995-96 (Nair et. al 1999). The paddy fields are recklessly being converted for the cultivation of the crops, which are economically more attractive and less labour absorbing. In Kerala there were not less than 300 traditional varieties of rice being cultivated before the advent of green revolution (Kumar, S.1999). People of this State have carefully chosen many varieties of the kind which taken care both their food needs as well as health requirements. However, as of today hardly few tens of this kind only existing with those farming communities who are still continuing the age-old traditions in paddy cultivation. These land races have survived just because of the efforts of the farmers who were reluctant in giving up of their seed materials and farming methods despite of heavy pressure from the government side.

There are several reasons for failure in the paddy cultivation in this state. The foremost, beyond any doubt is the non-availability of farming labourers in time and their high wages. When rice cultivation was a family activity this was not at all felt at this score, but the situation has changed to a great deal today. The other pertinent causes to the aversion to paddy cultivation are the following: *Non availability of quality seeds* adapted to local conditions; *the climatic fluctuation* that affects the cultivation of rice in a severe way. The changed pattern of rains which affects seriously in the timing of seed sowing and transplanting. *Heavy application of chemical fertilisers* resulted in the loss of several beneficiary biodiversity elements from the paddy fields, and it led the degradation of soil fertility. *Shortage of organic fertilisers and organic pesticides* in the market is another problem for the failure. *No encouragement for farmers from the government side* to cultivate the traditional varieties augmented the failure. Nair et. al 1999 have recommended a number of useful strategies to save the paddy cultivation of Kerala. However, it is a great challenge to accomplish this without strong political will.

## Reference

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