

DEVELOPMENT OF SPICE PARK, HAVERI KARNATAKA



Project Information Memorandum (PIM)

Foreword

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Introduction

1. Project Background

Spice processing is a dynamic and emergent sector and plays a vital role in contributing towards the economy of the Country. These industries have the potential to provide opportunities for income generation and employment. This is particularly important because spice growers currently have a poor price realisation.

Within the past one decade the international trade in spices has grown by leaps and bounds. An estimated 990,000 tonnes of spices and herbs valued at 2700 million USD are now imported globally every year. An impressive 47% of this supply in terms of volume (and 44% in terms of value) comes from India. India's exports of spice extracts have shown spectacular growth attaining over 44 percent of the global market within a short span.



Figure 1: Karnataka district map

Karnataka plays a major role in spice production and exports. For spices like vanilla, cinnamon, tamarind, chilli and ginger, the State is a major contributor in total Indian production. There is huge potential for exports of quality spices from Karnataka; however the existing infrastructure is not sufficient. To promote Spice industry and to provide necessary infrastructure, Government of Karnataka intends to set up a Spice Park in Karnataka to boost the exports of spices and better price realization for the growers.

Sector Profile

2. Spices Industry

Spice Processing is one of the growing markets in India and the world for the following reasons:

- Increase in per capita income and purchasing power.
- A largely growing domestic market for spices.
- Increased usage of spices in the food.
- Growing international demand for spices.
- Increasing number of working women.
- Well developed infrastructure and distribution network.
- Fast expansion of electronic and print media.



In recent years, export of Indian spices has been growing at a steady rate. This remarkable achievement is born of a sea change in the industry scenario. From traditional commodity exports, Indian Spices have evolved into a state-of-the-art industry. Absorbing technology, broad basing its products range, developing value added products, identifying niche markets, forging strategic alliances clinching global collaborations and joint ventures. The growth in exports is shown below:

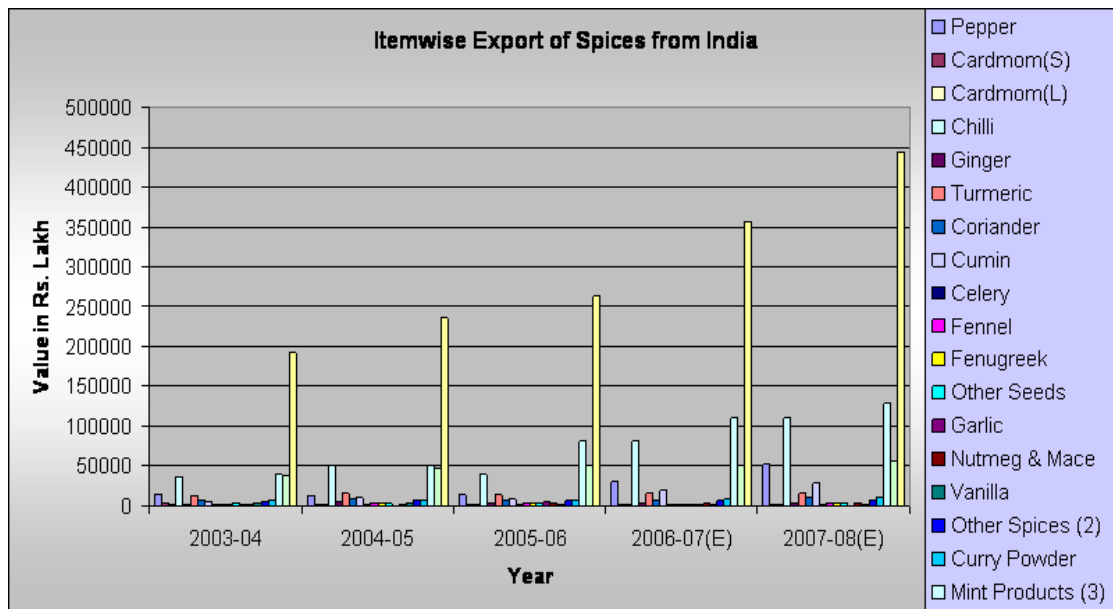


Figure 2: Growth in spice exports from India

Table 1: Item-wise Export of Spices from India

| Item-wise Export of Spices from India | | | | | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Item | 2003-04 | | 2004-05 | | 2005-06 | | 2006-07(E) | | 2007-08(E) | |
| | Qty | Value | Qty | Value | Qty | Value | Qty | Value | Qty | Value |
| Pepper | 16635 | 14277 | 14148 | 12171 | 17363 | 15095 | 28750 | 30620 | 35000 | 51950 |
| Cardmom(S) | 757 | 3692 | 642 | 2362 | 863 | 2682 | 650 | 2236 | 500 | 2475 |
| Cardmom(L) | 924 | 1234 | 954 | 1130 | 1046 | 1155 | 1500 | 1695 | 1325 | 1500 |
| Chilli | 86575 | 36688 | 138073 | 49903 | 113174 | 40301 | 148500 | 80775 | 209000 | 109750 |
| Ginger | 4696 | 2275 | 13890 | 5986 | 9411 | 4296 | 7500 | 3975 | 6700 | 2800 |
| Turmeric | 37044 | 13112 | 43097 | 15625 | 46405 | 15286 | 51500 | 16480 | 49250 | 15700 |
| Coriander | 21018 | 7201 | 33582 | 8209 | 23756 | 6771 | 20500 | 7462 | 26000 | 11025 |
| Cumin | 7957 | 5884 | 15767 | 11529 | 12879 | 9819 | 26000 | 20150 | 28000 | 29150 |
| Celery | 4815 | 1520 | 4297 | 1450 | 4165 | 1501 | 3550 | 1321 | 2900 | 1325 |
| Fennel | 5007 | 2211 | 7590 | 2750 | 5725 | 2782 | 3575 | 2380 | 5250 | 2850 |
| Fenugreek | 6932 | 1555 | 14635 | 2748 | 15525 | 3403 | 8500 | 2699 | 11100 | 3300 |
| Other Seeds | 14031 | 3397 | 16576 | 4019 | 12670 | 3322 | 8000 | 2240 | 8850 | 3125 |
| Garlic | 3691 | 1423 | 2929 | 736 | 34688 | 4798 | 11500 | 2128 | 675 | 400 |
| Nutmeg & Mace | 1420 | 2638 | 1260 | 2324 | 1530 | 3117 | 2100 | 4274 | 1300 | 2875 |
| Vanilla | 27 | 3872 | 43 | 2876 | 72 | 1227 | 125 | 1996 | 200 | 1775 |
| Other Spices (2) | 19291 | 5949 | 15651 | 7388 | 21134 | 7493 | 19500 | 7280 | 19000 | 8100 |
| Curry Powder | 8318 | 6805 | 8415 | 6697 | 9340 | 7838 | 9500 | 8693 | 11500 | 11100 |
| Mint Products (3) | 10110 | 39436 | 11143 | 50219 | 14544 | 81321 | 16250 | 110095 | 21100 | 128050 |
| Oils & Oleoresins | 5133 | 37992 | 5831 | 46931 | 6074 | 50557 | 6250 | 51079 | 6600 | 56300 |
| Total | 254381 | 191160 | 348523 | 235052 | 350364 | 262762 | 373750 | 357575 | 444250 | 443550 |
| (1) Include Bishops Weeds (Ajwan seed), Dill Seed, Poppy Seed, Aniseed, Mustard etc. | | | | | | | | | | |
| (2) Include Tamarind, Asafoetida, Cinnamon, Cassia, Cambodge, Saffron, Spices (Nes) etc. | | | | | | | | | | |
| (3) Include Menthol, Menthol Crystals and Mint Oils. | | | | | | | | | | |
| Source: DGCI&S., Calcutta/Shipping Bills/ Exporters' Returns. | | | | | | | | | | |
| (Qty in Tonnes & Value in Rs. Lakhs) | | | | | | | | | | |

Also spices have a major share in the Consumer purchase basket. This is driven by increase in disposable income and increasing share of young working population.

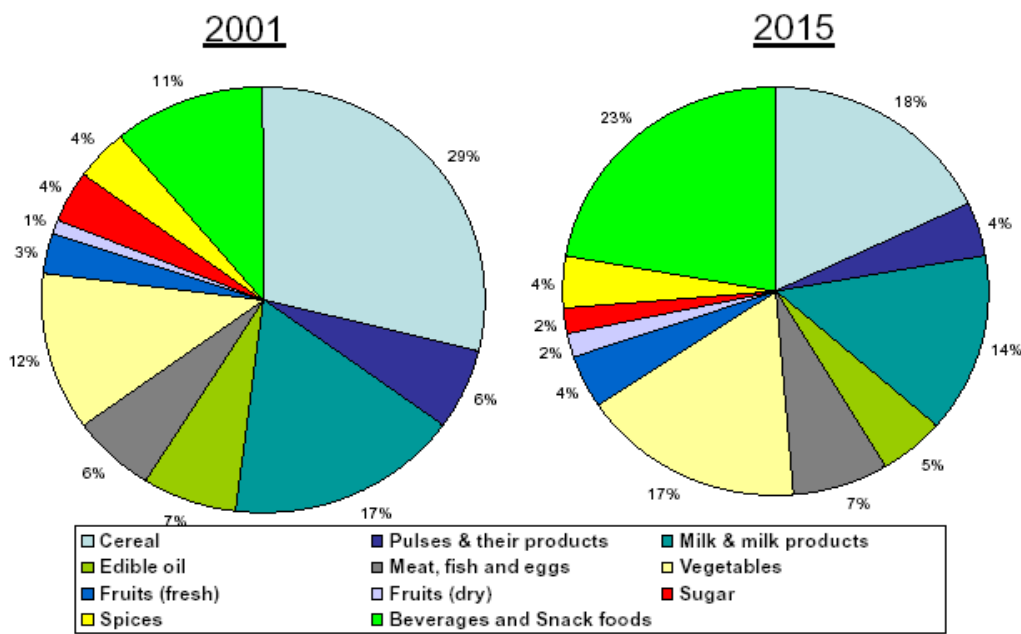


Figure 3: Consumer purchase basket showing share of spices in India

India has high competitive advantage over many nations; but it is not able to use it to the full extent. The factors reducing the acquired comparative advantage are non-availability of:

- Suitable fertilizers and plant protection chemicals
- Proper irrigation facilities
- Facilities for on farm processing and storage
- Lack of marketing and training facilities for farmers
- Adequate credit

Considering the huge small grower's base, this issues gain greater significance in the areas of production and sustenance.

Agricultural extension in many states is market-oriented. Extension is not focused on the needs of the market, especially the export market. This service is limited to a few areas and to a few sections and often fails to recognise indigenous methods and factors to get a competitive edge in export of spices.

2.1 Need for integrated approach

The integrated approach is critically important for the spice processing industry to work efficiently. A well integrated approach which captures farmers, traders, spice processors, distributors and retail stores can expand the markets for spice products and add value by

vertically integrating primary production and spice processing systems and minimize post harvest losses.

In addition such activities would reduce seasonality of consumption of a spices, increase the viability, profitability and sustainability of production systems through their impact on increasing farm incomes, rural employment and foreign exchange earnings, while reducing marketing risks.

In the absence of facilities such as Spice Park that help in value addition, the farmers have to depend on middle men to sell their produce. Spice processing industries have a crucial role to play in reduction of post harvest losses. The advantage in setting up the spice processing industries is that a substantial portion being rural based, it has a very high employment potential with significantly lower investment. This will result in a win-win situation for the stakeholders involved and better price realisation for the growers.

2.2 Issues in spice sector

The main issues in the spice sector are:

- Lack of availability of quality planting material
- Adoption of traditional cultivation practices and lack of scientific perspective
- High wastage due to lack of proper post harvest practices
- Lack of quality control facilities
- Lack of drying and processing units
- Lack of assistance for cultivation
- Low productivity of Indian spices
- Poor availability of inputs
- Non-availability of – suitable fertilizers and plant protection chemicals
- Lack of real time knowledge of area sown
- Inadequate price for producers
- Insufficient mechanisation of spice production and processing.

2.3 Spice Park Concept

The concept of Spice Park is a new way of producing, processing and marketing spices. It constitutes a system innovation and involves several links of the production chain. Spice Park requires major technological innovations and incorporation in existing or new organizational forms to make the concept a long-term success. The facilities provided by this park ranges from procurement, grading, processing, marketing, communication and exports.

A Spice Park can be defined as an industrial park exclusively for the spice industry which offers tiny and medium scale entrepreneurs a range of facilities such as:

- Grading
- Sorting
- Steam sterilization
- Processing
- Storage
- Packing
- Power, water etc.

Many of the existing issues in Spice production chain will be solved in this Spice Park.

Table 2: Issues related to spice sector as addressed by Spice Park

| No. | Issues in Spice Sector | As Addressed in Spice Park |
|-----|---|--|
| 1 | Low productivity of spices | Training for efficient use of soil, water, bio-resources, fertilizers and pesticides and concept of Contract Farming improve productivity. |
| 2 | Lack of high-end value addition | Use of state-of-the-art technology and research developments will ensure high-end value addition. |
| 3 | Poor price realization for growers | Spice Park provides support and will result in better price realization |
| 4 | High wastage due to lack of proper post harvest practices | Formation of Collection Centres, Primary Processing Centres, Core Processing Facilities in Spice Park. |
| 5 | Lack of information in trends of markets and awareness & education for utilization of market infrastructure and post harvest facilities | Market Research & Development Centre set up in Spice Parks. |
| 6 | High transportation and air freights | Spice Park shall have logistics hubs. |

Present Government Schemes

3. Initiatives by Ministry of commerce & industry

The Government through its Spices Board has taken a number of steps to promote the spice production and exports in the Country. Research facilities are developed for carrying out various research programmes in crop improvement and evaluation through selection, hybridisation and biotechnological approaches. Various quality control standards, procedures are developed to ensure export of quality-spices from the country. Export of spices is promoted by the ministry to tap the international demand.

A. Special Purpose Fund for Replantation and Rejuvenation of Cardamom Plantations

The objective of the scheme is to improve production and productivity through replanting/rejuvenation of the old and uneconomic plantations of cardamom (small) in the states of Kerala, Karnataka, Tamil Nadu and cardamom (large) in Sikkim and Darjeeling district of West Bengal. Production and distribution of disease free, healthy and quality planting materials are also taken up through certified nurseries opened in grower's field with the technical supervision of the officers of the Board and Departmental Nurseries. Beneficiaries selected under the scheme are given financial assistance as cash subsidy on successful completion of the following programmes in their plantations.

(i) Replanting

This programme is intended to encourage registered small and marginal growers of cardamom to take up replantation of old, senile and uneconomic plantations of cardamom small and in the case of cardamom large, using disease free and healthy planting materials. Subsidy will be provided in two annual instalments.

(ii) Rejuvenation

Under rejuvenation programme, poor yielding plants in the existing plantations will be identified and removed and the gaps thus formed will be filled with quality planting material. In addition to this, gap filling, scientific plant protection operations, fertilizer application, inter-culture operations, irrigation and other good agricultural practices as per the recommended package of practices will be adopted.

(iii) Planting Material Production

High yielding healthy and quality planting material of cardamom is mainly produced through certified nurseries opened in grower's field under the guidance and supervision of Board's technical personnel. In Karnataka, in addition to certified nurseries, production is taken up through Departmental nurseries also from where planting material is distributed to growers at cost price.

B. Export Oriented Production & Post Harvest Improvement of Spices

The programmes and activity components under the scheme are for improving productivity and quality of cardamom and post harvest improvement of spices at farm level, encouraging organic production of spices, creation of replicable models

based on integrated pest management, development of spices with export potential in North Eastern Region, extension advisory service to spice growers etc.

C. Cardamom small (Kerala Tamil Nadu & Karnataka)

(i) Irrigation and land development

The programme aims at developing perennial water resources in cardamom plantations by constructing water storage devices like farm ponds and wells. Soil & water conservation methods are also supported. In Kerala and Tamil Nadu the programme is implemented by Spices Board utilizing its own fund, whereas in Karnataka implementation is with the partial financial assistance of WGDP Karnataka.

(ii) Rain water harvesting devices

Spices Board is promoting various methods for irrigating cardamom plantations with the use of rainwater in the states of Kerala, Karnataka and Tamil Nadu.

(iii) Improved cardamom curing devices

The objective of the programme is to popularise improved cardamom curing devices, using LPG/Diesel/Bio-mass and firewood as alternate source of fuel, among the small growers of Kerala, Karnataka and Tamil Nadu.

D. Cardamom Large (Sikkim & Darjeeling Dist. of West Bengal)

(i) Construction of curing houses: Modified Bhatti

Large cardamom growers traditionally cure their cardamom in the locally fabricated bhattis. This does not ensure proper drying and ideal colour in the cured cardamom. Board had introduced and evaluated a number of curing methods using different fuels and has selected modified system, which gives good quality. In order to popularize this method, Board is providing subsidy for construction of such modified bhattis.

(ii) Rain water harvesting devices

The Board propose to implement the programme of rain water harvesting in the state of Sikkim and Darjeeling district of West Bengal for providing irrigation to large cardamom plantations in summer months as done in the case of small cardamom plantations of South India.

E. Development of spices in North Eastern States: Assam, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland & Tripura (Other than Sikkim)

Chilli, ginger and turmeric are extensively cultivated in the North Eastern States. Some of the varieties in that area viz., 'China', 'Nadia', and 'Thingpur' in ginger, 'Lakadong' in turmeric and birds eye in chilli are considered rich in oil, curcumin content and capsaicin content respectively. The agro-climatic conditions prevailing in NE States are suitable for the cultivation of pepper and large cardamom and these crops can be profitably grown in these regions to create exportable surplus. There is great scope in promoting production of organic spices in these states by

popularizing organic farming practices among the growers so that sufficient quantity of organic spices can be made available for exports.

Hence the following programmes are also implemented apart from above mentioned ones:

- (i) Large cardamom development (New Planting)
- (ii) Organic cultivation of pepper
- (iii) Organic cultivation of Lakadong turmeric
- (iv) Organic cultivation of ginger
- (v) Training of officers and farmers of NE states

D. Programmes for other spices

- (i) Byadagi Chilli – Rainwater Harvesting
- (ii) Seed spice Threshers (Power operated and manually operated)

3.1 Initiatives under Eleventh Five Year Plan

The Eleventh Five Year Plan aims at improving the export of spices from the Country. Following are the different schemes in the Eleventh Plan which aims at improving the export of spices.

A. Promotion of Indian Spice Brands Abroad

This scheme is for assisting exporters in penetrating the developed markets through launching/promoting own brands or buying out existing brands. The scheme aims to promote Indian Spice Brands in new, sophisticated and affluent segments in foreign markets, targeted beyond the ethnic Indian population in these countries and in the Middle East. There are two activities assisted under the scheme viz.

- (i) Product and Packaging Development and Bar Coding
- (ii) Brand Promotion

B. Infrastructure Development

There are four components under the programme of 'Infrastructure Improvement'

- Adoption of Hi-Tech in Spice Processing
- Technology and process upgrading.
- Setting-up/upgrading in-house quality control laboratory
- Quality certification, validation of check samples, training of lab personnel for export development of spices and spice products.

Providing assistance for these components are necessary to empower the industry to adopt such methods of processing the produce by which the country may acquire a distinct image as the source of quality/safe products, consistency in meeting quality requirements and obtain recognition for the country as the 'international processing hub'.

(i) Trade Promotion

There are three components under the programme of "Trade Promotion"

- Sending Business Samples Abroad
- Printing Promotional Literatures/Brochures
- Packaging Development and Bar Coding Registration

Providing assistance for these components are essential for developing export business, securing orders, better presentation of capabilities to the buyers and to promote modern/scientific packaging for retail market by which the country may build up better image, increased shelf life for the products and higher value realization.

(ii) Spices Processing in North Eastern Region

This scheme proposes to provide financial assistance to the spice growers' co-operatives, farmers' associations, NGOs representing spices growers and individual entrepreneurs in North Eastern and hill states to establish primary processing facilities for spices for organized marketing of the produce in domestic and international markets with possible value addition. Under this scheme, all types of primary processing facilities, which do not require very high investments, are envisaged here to ensure dispersed and relatively low to middle level value addition, particularly to avoid distress sale and large-scale wastage of locally grown spices will be supported.

(iii) Product Development & Research

Under this programme, it is proposed to provide financial assistance to the exporters/ research institutions to undertake product research & development.

Major areas for assistance are:

- Utilization of the services of national or international research institutes for developing new spice products/applications or for establishing traditional and non-traditional values.
- In-house research programmes by entities with sufficient infrastructure facilities.
- Clinical trials to establish and validate therapeutic properties of spices through reputed third parties.
- Patenting and product registration in consuming countries.

(iv) International Trade Fairs/Meetings

Under this programme Participation in International fairs/exhibitions/meetings/seminars are assisted for market expansion. Assistance under these components is provided to induce exporters for exhibiting spices and spice products, building up business relationships and collect information on the changing market requirements for taking appropriate action.

3.2 Other Centrally sponsored Scheme

Some of the other centrally sponsored schemes for the development of agri and food processing sector are:

A. General Post harvest improvement programmes for spices

Most of the importing Countries have prescribed stringent quality standards for agri products including spices. These standards are becoming more and more stringent and could become effective trade barriers impacting spice exports. It is therefore necessary to educate, motivate and support the growers to adopt hygienic post harvest practices to improve the quality of spices and to create a perception all over the world that India is a source of good quality spices. Hence the following programmes are implemented.

(i) Construction of drying yards for drying spices

This programme aims at construction of concrete/cemented drying yards in the farmers' field for drying spices like chilli, ginger, turmeric, pepper, seed spices and tree spices on clean and hygienic surfaces. The estimated cost of construction is Rs.600/- per square meter. Community drying yards by NGOs/Farmers' Groups (SHGs), Association of Farmers & Agri. Market Committees will be given 50% of the cost of construction as subsidy and the maximum area of drying yard that is eligible by the group will be proportionate to the members thereof.

(ii) Supply of polythene sheets for drying spices

In order to dry spices under hygienic conditions, the Spices Board subsidises the supply of polythene/silpaulin sheets to the small and marginal growers. Board will arrange centralized purchase and supply of the sheets to eligible growers.

(iii) Supply of Moisture Metre

One of the important parameter which decides quality of spices is the percentage of moisture in the dried/cured produce. If moisture is excess than the optimum level there are chances for getting the product affected by mould and finally contaminated by the presence of mycotoxin (eg. Aflatoxin). As the curing and processing are on farm operations farmers are to be equipped with devices for detecting the moisture level present in the final product for maintaining the quality. Hence supply of moisture meter is proposed.

(iv) Quality Improvement Training Programmes

For ensuring quality of the final product maintenance of quality at every stage has to be taken care of. This requires education at all levels. Hence Quality Improvement Training Programmes are organized in all the spice growing tracts based on a schedule drawn up for the purpose every year. The trainings will cover topics on good agricultural and improved post harvest improvement practices which are authenticated by IISR, ICRI, and various Agricultural Universities etc. for various spices. Technical literature on the subject is also distributed in vernacular. The trainings are organized for farmers, traders, representatives of NGOs and Officers of State Agriculture/Horticulture Departments. Incidental expenses for conducting the programmes are met by the Board at maximum costs fixed per programme. Farmers' Groups, NGOs & State Departments can collaborate with Spices Board for organizing such programmes.

B. Promotion of organic farming

Internationally, the niche market for organically produced spices is growing at a fast rate. Early entry into this segment will improve the exportability and demand for Indian spices. In addition, availability of organically grown spices will help the country to withstand competition from low cost countries in South East Asia. The major bottlenecks in promoting organic farming are non-availability of organic

farm inputs and high cost of organic certification of farms and processing units. Hence the following programmes are proposed.

(i) **Assistance for Certification of Organic farms/Processing units**

The programme aims to help growers/processors of spices in acquiring organic certification, which is a pre-requisite for marketing organic spices. Board will assist individual farmers/processors and groups of farmers, NGOs and Farmers Co-operative Societies/Associations in acquiring certification for their farms/ processing units.

(ii) **Bio-Agent units**

A major issue faced by the spice industry is the presence of pesticide residue in the end product. There are chances of contamination of the product with pesticide residue at the production level due to non-judicious application of pesticides for controlling pest and diseases in the field. Board is now trying to reduce the number of sprays taking place in spice cultivation by various means like promoting organic farming, integrated pest management practices and biological control. For controlling diseases in spices especially in crops like cardamom, pepper, vanilla, ginger and turmeric application of bio-agents like trichoderma and pseudomonas are found effective. Multiplication of these bio-agents can be done in small-scale bio-agent units for distribution among the spice growers. Hence, Board proposes to set up bio-agent production units by providing financial assistance. The programme is proposed to be implemented with the participation of interested NGOs. This unit will also serve as a training centre for personnel who are interested to start multiplication of bio-agents.

(iii) **Organic cultivation of spices**

Since the market for organic products is gradually registering an upward trend, there is good scope for promoting organic cultivation of spices in suitable locations. Board will assist growers in taking up organic cultivation of spices in identified spices and areas. Assistance of selected NGOs having credible past records will be utilized for implementing the programme if requirement is felt by the Spices Board.

(iv) **Support for vermi-compost units**

One of the requirements for organic certification is on-farm production of inputs. Hence there is need to produce organic inputs in the farm itself to maintain soil fertility and to support organic production. Vermicompost is organic manure which can be produced from farm waste using earthworms. In order to enable the growers to produce vermicompost, setting up of vermicompost units are supported.

C. Extension advisory service

Transfer of technical know-how to growers on production of spices is an important factor in increasing productivity. This programme envisages technical/extension support to growers on the scientific aspects of cultivation through personal contact, field visits, group meetings and through distribution of literature in vernacular languages for increasing productivity and improving quality of cardamom in the states of Kerala, Karnataka and Tamil Nadu, development of large cardamom in the states of Sikkim and West Bengal and selected spices in the North East and small pockets across the Country. The schemes of Spices Board viz. Special Purpose Fund for Replantation & Rejuvenation of Cardamom Plantations and Export Oriented Production and Post-harvest Improvement of Spices are implemented through this extension network.

D. Recognition of Spice Growers

In order to encourage healthy competition among growers for improving production, productivity and quality of cardamom small, cardamom large, vanilla and organic spices, Spices Board has instituted awards for the best growers with one first prize and two second prizes in each of the above categories. The first prize carries a cash award of Rs. 100,000/-, citation and certificate. Each second prize carries cash award of Rs. 25000/-, citation and certificate (One prize is reserved for woman grower). The nominations are collected through Board's offices and awards given based on field assessment by an expert committee constituted for the purpose.

3.3 Spice Park Scheme

To empower the growers of spices and ensure better price realization, Board has taken steps to establish Spice Parks at the following seven locations to provide scientific infrastructure facilities. The projects on Spice Park are primarily intended to benefit the growing community through quality improvement, grading, packing, warehousing, etc for value addition which would lead to better price realization of their produce. The exporters can also set up their unit in the Parks for processing spices under the terms and conditions of the Board.

The centres where Spice Parks proposed are: Chhindwara (Madhya Pradesh), Guntur (Andhra Pradesh), Sivaganga (Tamil Nadu), Idukki (Kerala), Mehsana (Gujarat), Jhalawar (Rajasthan) and Haveri (Karnataka). Spice Park will facilitate in:

- Strong linkages with horticulture
- Enhance project implementation capabilities
- Increased involvement of private sector investments and support for creation of rural infrastructure to ensure a steady supply of good quality spice produce
- Mechanism to bring farmers, processors and retailers together
- Link agricultural production to the market so as to ensure maximization of value addition
- Minimize wastages and improve farmer's income.
- Well-defined spice-processing zone containing state of the art processing facilities with support infrastructure and well established supply chain.

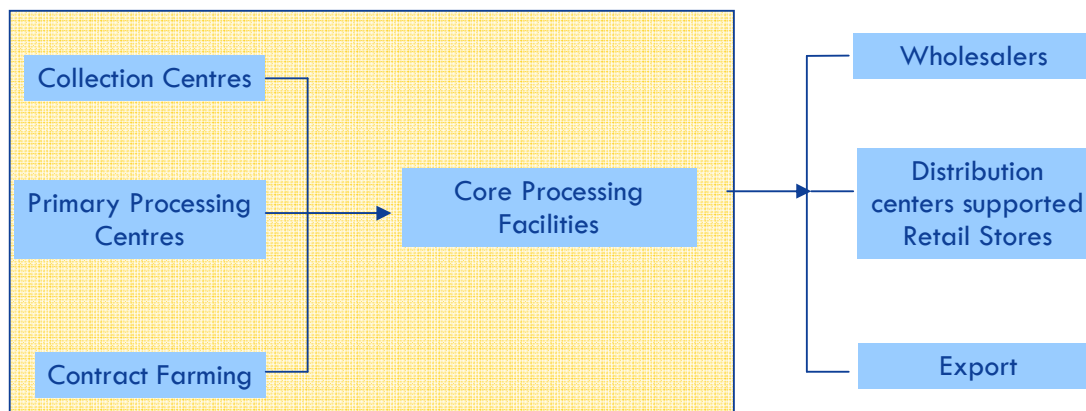


Figure 4: Integrated supply chains

Implementation of the projects would be assisted by professional Project Management Agencies (PMA) from concept to commissioning.

3.4 Schemes by the State Government

The schemes by the Government of Karnataka are:

- **Popularization of bio-fertilizers**

With a view to promote the use of bio-fertilizers as an environment-friendly and cheaper source of plant nutrients, Government of Karnataka has taken steps to popularize development and use of Bio fertilizers. With the popularization of bio fertilizers the government intends to emphasize on the organic farming technique as it generates higher revenues mainly because the demand for organic food has been growing.

The Scheme envisages encouraging farmers to use bio-fertilizers which are cheaper compared to chemical fertilizers and also helps to keep a check on environment pollution. Production of bio-fertilizers in Agricultural Universities, distribution to farmers on subsidy, quality control is some of the strategies adopted.

- **Scheme for plant protection measures**

It is a State scheme and the main objective is to distribute Plant Protection Chemicals to farmers at subsidy in the event of outbreak of endemic and epidemic pests and diseases. The Government allotted Rs. 35 lakh in its budget in the year 2000-2001 for the same.

- **Study tour of farmers within the State and country**

The main objective of the Scheme is to expose farmers to new Agricultural technologies developed within and outside state by Agricultural Universities and other institutions, and to enable farmers to adopt them for their benefit. This initiative is basically in place to help the farmers learn new and better techniques as to adapt the same.

- **Special component and tribal sub-plan**

Usually due to low availability of finance in tribal regions the total productivity tends to be low as the techniques and inputs used are traditional. Thus this Plan aims at increasing per acre yield in the land of Schedule Caste and Schedule Tribe farm families, to uplift the two categories. Strategy envisages distribution of inputs, equipments, power tillers, pump sets, storage bins, land development, etc.

- **Supply of power tillers and tractors as an incentive to farmers**

This Scheme was launched to put an end to the traditional methods of farming and bring in mechanization in its place. The government offer power tillers and tractor at very subsidized rates so that even a farmer with weak financial status can avail these equipments.

Status of Spice Industry, Karnataka

4. Present Scenario

Karnataka is the eighth largest State in the country and it is located in southern peninsular India, with a geographical area of 190.50 lakh hectare, accounting for 5.84% of the total geographical area of the country. The State consists of 27 districts with 175 taluks. Karnataka is a maritime State with a coastline of 287 kms covering the districts of Uttara Kannada, Dakshina Kannada and Udupi with nine ports excluding new Mangalore port. Except Karwar, the remaining ports are riverine ports which need to be developed for cost efficient movement of goods. The State has a road length of 1.49 lakh kms and a railway route length of 3041 kms.

The Economy of Karnataka is well diversified and according to the Economic Survey 2003-04 Karnataka contributes 5.0% to National NDP. Agriculture in Karnataka contributes 26.7% of the State GDP and employs 71% of total workforce. The land topography is suited for agriculture and 83% of area (Soil types) is suitable for agriculture. The State has a high geographical diversity with ten agro climatic zones. The Net sown area is 54% of the total Geographic area against the national average of 46%. The Gross cropped area has exceeded 116 lakh hac with a cropping intensity of 112%. Small and marginal farmers accounts for 73% of total holdings and 34% of net cultivated land. Though Agro climatically suited, water is a main constraint in horticultural development. Irrigation covers 25% of the net cropped area and remaining 75% is rainfed. Horticulture crop covers 14.8% of the net cultivable area in the State with an annual production of 118.2 lakh tones. Horticulture contributes 40% of the agriculture income and 80% of the agricultural exports.

Karnataka offers an excellent market for spice processing companies. The State Government has initiated a number of measures to facilitate and sustain investments at every point in the spice chain from producer to consumer.

4.1 Agro Climatic Conditions

As per the Agro-climatic Regional Planning (ACRP) of Planning Commission, Government of India, Karnataka State falls in Zone X (Southern Plateau and Hills Region) and Zone XII (West Coast Plains and Ghat Region). Based on physio-graphic features, Karnataka can broadly be divided into four regions viz., Coastal, Malnadu (Hilly), Northern Plateau and Southern Plateau Regions. The Coastal Region lies between the Western Ghats and the Arabian Sea. It is a narrow region with a maximum width of 40 km. It has elevations upto a maximum of 200 m. The Malnad region comprises steep ranges with valleys and hills running almost parallel to the coast. It is thickly vegetated with evergreen forests and receives moderate rainfall. The Northern Plateau region is almost a flat terrain with elevations ranging from 300 m. to 650 m. It falls in the rain shadow region and is prone to drought. The Southern Plateau region has undulating and rolling topographic features with sporadic hills. It has elevations ranging from 600 m. to 1000 m. Karnataka has 10 agro-climatic zones and is an ideal place for growing virtually every kind of agricultural and horticultural produce.

- North Eastern Transition Zone
- North Eastern Dry Zone
- Northern Dry Zone
- Central Dry Zone
- Eastern Dry Zone
- Southern Dry Zone

- Southern Transition Zone
- Northern Transition Zone
- Hilly Zone
- Coastal Zone

4.2 Soil Types

Karnataka has six distinct soil types, and is an ideal place for growing virtually every kind of agricultural and horticultural produce.

- Red soils: Red gravelly loam soil, Red loam soil, Red gravelly clay soil, Red clay soil
- Lateritic soils: Lateritic gravelly soil, Lateritic soil
- Black soils: Deep black soil, Medium deep black soil, Shallow black soil
- Alluvio-Colluvial Soils: Non-saline, saline and sodic
- Forest soils: Brown forest soil
- Coastal soils: Coastal laterite soil, Coastal alluvial soil

4.3 Cropping Intensity and Pattern

The diverse agro-ecological conditions facilitate growth of large varieties of crops covering fruits, vegetables, flowers, spices, plantations, roots and tuberous crops, aromatic crops, medicinal crops, oil palms etc. The Net sown area is estimated to 104.89 lakh hectares accounting for 54% of the geographical area. On the National Level, Karnataka stands:

- First in floriculture
- Second in Spice & plantation crops
- Third in coconut production and
- Fifth in fruits and vegetables



Figure 5: Indian Spices

4.4 Issues associated with State Horticulture

The issues related to horticulture in the State are:

- Lack of suitable varieties for Processing
- Endemic diseases (Pepper wilt)
- Leasing of orchard and farms is a common practice, prevents farmer from taking interest in post harvest
- Lack of proper maintenance of farms and orchards
- Price fluctuation
- Lack of information in trends of markets
- High wastage due to lack of proper post harvest practices
- Awareness & Education for utilisation of market infrastructure and post harvest facilities by the farmers.
- High transportation and air freights charges

4.5 Spice Production in Karnataka

Karnataka is one of the leading states in Spice production. The production of major spices over the last several years is as listed below.

Table 3: Year-wise Production of Major Spices in Karnataka

| Item wise Area & Production of Spices in Karnataka | | | | | | | | |
|--|---------|------------|---------|------------|---------|------------|---------|------------|
| Spices | 2004-05 | | 2005-06 | | 2006-07 | | 2007-08 | |
| | Area | Production | Area | Production | Area | Production | Area | Production |
| Pepper | 24260 | 5430 | 14797 | 12000 | 15150 | 12000 | 16320 | 13465 |
| Cardmom(S) | 27094 | 1879 | 27173 | 1775 | 26611 | 1725 | 24976 | 1585 |
| Chilli | 144710 | 230430 | 125670 | 106810 | 137850 | 164300 | 136700 | 154760 |
| Ginger | 14820 | 160190 | 21670 | 282410 | 20489 | 198180 | 14780 | 194230 |
| Turmeric | 10850 | 60030 | 6350 | 33890 | 12720 | 82470 | 8520 | 64720 |
| Coriander | 9050 | 10360 | 9160 | 1390 | 8760 | 9560 | 6420 | 1010 |
| Garlic | 6000 | 46000 | 4930 | 3480 | 5190 | 43270 | 6140 | 4440 |
| Clove | 183 | 283 | 188 | 294 | 95 | 120 | NA | NA |
| Nutmeg | 219 | 291 | 218 | 163 | 136 | 199 | NA | NA |
| Cinnamon | 21 | 6 | 21 | 6 | 50 | 9 | NA | NA |
| Tamarind | 15094 | 74230 | 15550 | 77200 | 15674 | 80020 | NA | NA |

Area in Hectares, Production in Tons

Spice production in Karnataka is steadily on the rise and increasing year after year. The growth in spice production in Karnataka is shown in the following figure.

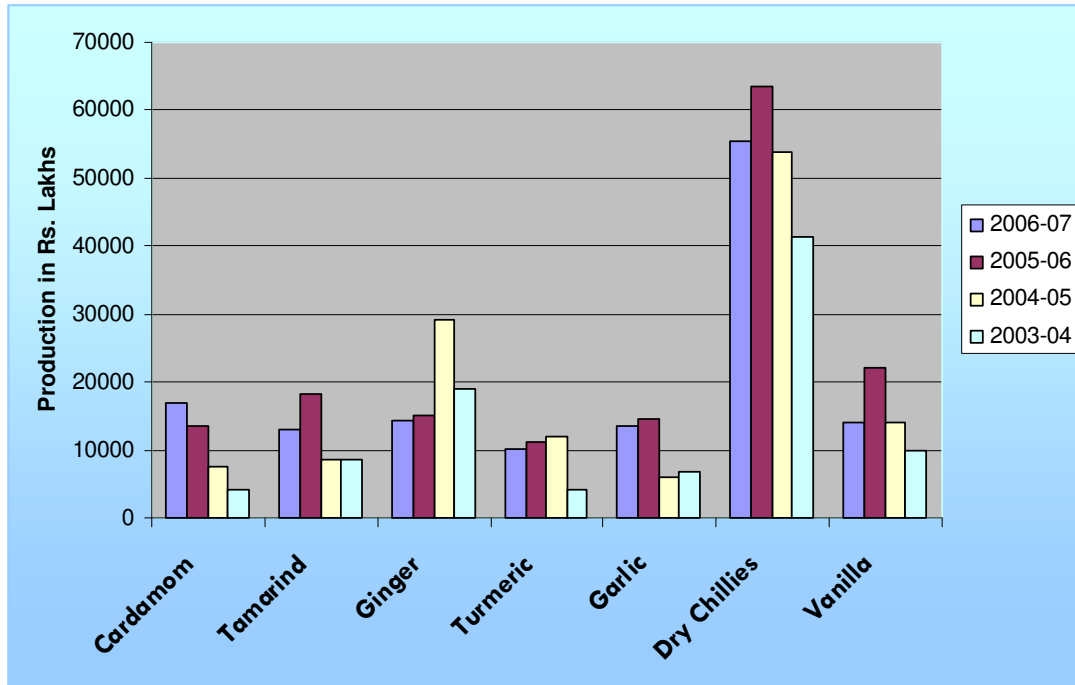


Figure 6: Spice Production in Karnataka

Following chart shows that Karnataka is a major contributor in all India Production for spices like Vanilla, Cinnamon, Tamarind, Pepper, Ginger and Chilli.

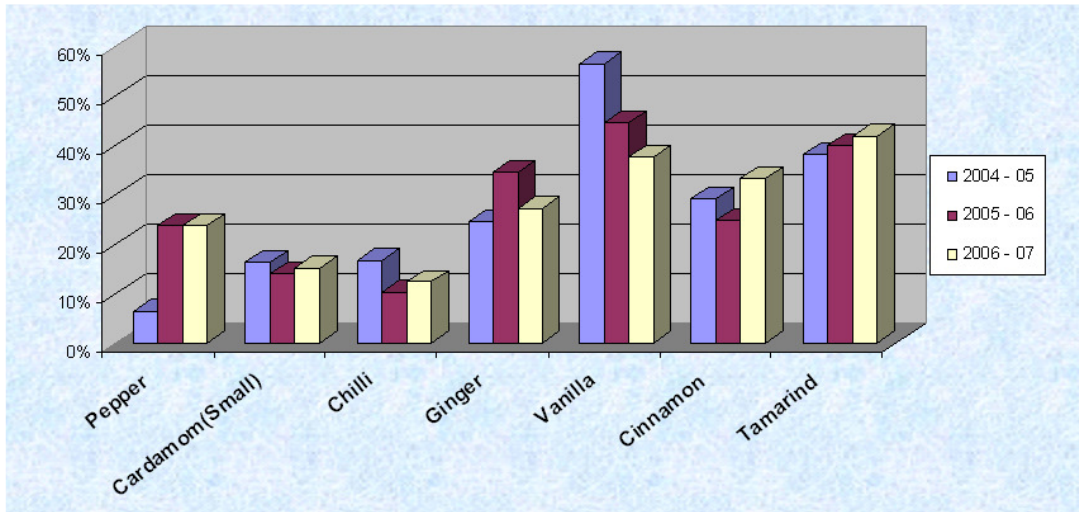


Figure 7: Karnataka Spice Production as % of Total Indian Production

About Haveri

5. Present Scenario

Haveri district is exactly in the center of Karnataka with equal distance from Bidar in the far north to Kollegal in the far south. It is bounded by Dharwad district on the north, by Gadag on north east, by Bellary on east, by Davangere on south, by Shimoga on south-west and by Uttar Kannada on west and north-west.

Haveri district has, for decentralized administration, two sub-divisions namely Haveri and Savanur. Haveri, the administrative and political Head Quarters of the District, is 335 Km. from Bangalore by road and 394 Km by rail.



Figure 8: Haveri District Map

5.1 Population

The area covered by Haveri district is 8,465 Sqkm. As per 2001 census, the population of Haveri is 1,439,116. There are seven talukas namely Hanagal, Shiggaon, Savanur, Haveri, Byadagi, Hirekerur, and Ranebennur.

5.2 Agro-climatic conditions

The Haveri district falls under the hilly zone and northern transition zone. The annual rainfall ranges from 619.4-1303.2 mm. About 61 % of rainfall is received in Kharif season. The elevation is 450-900 m and the soils are shallow to medium black clay and red sandy loam in equal proportions.

Agriculture being the main occupation in the district, of the 485000 hectare of the geographical area of the district 360030 hectare is cultivated. Jawar, Cotton, Rice, Chilies, Gram, Groundnut, sunflower, sugarcane, and oilseeds are the major crops of the district. Varada, Kumadhvati, Dharm and Tungabhadra are the main rivers of the district. Apart from sand and building stones no other mineral ores are found in the district

5.3 Extent of Agriculture Land

The extent of agricultural land in Haveri is as follows:

Table 4: Extent of Agricultural land, Haveri

| | | (In Hectares) | | | |
|------|--------------------|---------------|---------|---------|---------|
| S.No | Description | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
| 1 | Fruit crops | 5076 | 5258 | 5888 | 6006 |
| 2 | vegetable | 15812 | 21774 | 29009 | 24293 |
| 3 | spices | 29499 | 36179 | 35193 | 40736 |
| 4 | Garden/ plantation | 4060 | 4310 | 4554 | 4640 |

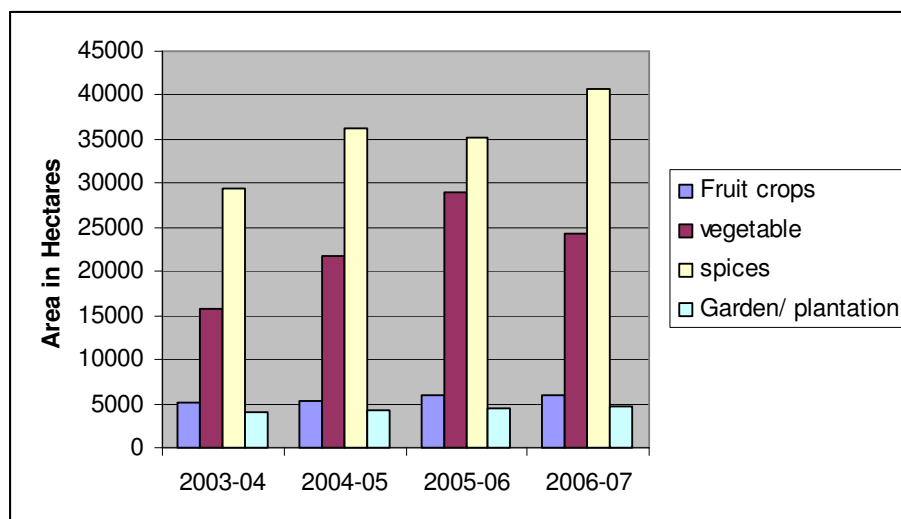


Figure 9: Extent of Agricultural Land, Haveri

5.4 Major spices in Haveri and surrounding Districts

The major spices produced in Haveri are dry chillies, ginger, garlic, vanilla and cardamom. The major spice industry in the district is the chilli powder mills. There is also a chilli processing facility in the district.

There is a huge scope for development and growing pepper in Haveri District. Tamarind and turmeric are also produced in the district but in lesser amounts. Turmeric production can

be increased taking advantage of the agro-climatic conditions. Coriander production can also be improved by specific focus and necessary improvements in the existing practices.

Production of various spices in Haveri, Dharwad, Gadag, Davangere, Bellary, Shimoga, Uttar Kannada and Koppal districts are as per following.

Table 5: Major spices in Haveri and Nearby Districts (Production in tons)

| Spice | Year wise production | | | |
|--------------|----------------------|---------|---------|---------|
| | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
| Pepper | 812 | 378 | 628 | 1297 |
| Cardamom | 111 | 122 | 127 | 137 |
| Tamarind | 3618 | 3679 | 3886 | 4130 |
| Ginger | 26529 | 26221 | 29349 | 38385 |
| Turmeric | 1175 | 932 | 1307 | 2205 |
| Garlic | 30623 | 33394 | 32059 | 25850 |
| Dry Chillies | 83444 | 123843 | 120351 | 130254 |
| Corriander | 2731 | 3983 | 5019 | 3186 |
| Vanilla | 137 | 322 | 691 | 706 |

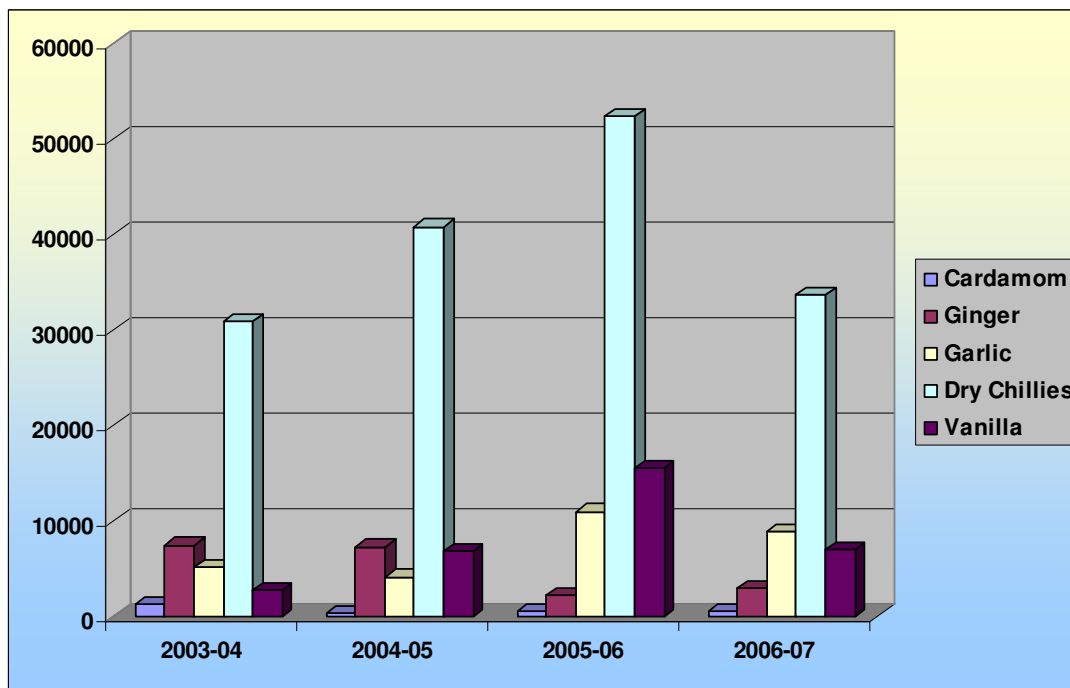


Figure 10: Major spices in Haveri (Value of Spices Produced in Rs. Lakh)

5.5 Linkages of Spices

The spices have market linkage with mandis and local processing units. There is no linkage with any AEZ and spice park as of now. Once a linkage is established with a spice park, the farmers will be benefited to large extent as ginger and pepper have a huge export potential.

Table 6: Existing Market Linkages of major spices

| Products | Market linkages | | | | | Export potential | Return to farmer |
|----------|-----------------|-----|--------|------------------|---------------|------------------|------------------|
| | Food parks | AEZ | Mandis | Processing units | Cold storages | | |
| Chilli | X | X | √ | √ | X | Medium | 25000 |
| Ginger | X | X | √ | X | X | Medium | 30000 |
| Pepper | X | X | √ | √ | X | High | 50000 |

Proposed Spice Park, Haveri

6. About the project

6.1 Location

Karnataka Industrial Area Development Board (KIADB) has identified around 120 acres of land in Byadgi in Haveri District. The town is well-known for its red Byadgi chillies. More than 38000 hectares of land is used for dry chillies production alone in the district. The dry chilli production is around 57,000 tons. The chilli market is in various parts of India like Gujarat, Bombay, Delhi, Kerala etc. The Byadgi Chillis are also exported to many countries.

6.2 Key Spices and basis of selection

Infrastructure facilities needed for processing are not identical across many spices. To find out the target spices for which the facilities are to be provided in the Spice Park, a detailed study has been carried out. Following factors were considered for determining the most suitable combination of spices to be targeted for this Park.

1. Production of spices in Karnataka
2. Value of spices produced
3. All India share of Karnataka in production of various spices
4. Spices production in and around Haveri
5. Export potential of the spices
6. Unit value of one kg of spice

Various spices are ranked according to their relative position for above mentioned factors and a matrix is made to determine the right combination. The matrix is as shown below:

Table 7: Matrix for selection of spices

| Matrix for selection of Spices | | | | | | |
|--|------------------|--------------|--------------|----------|----------|----------|
| Criteria | Weighted Average | Rank | | | | |
| | | 1 | 2 | 3 | 4 | 5 |
| | | Score 5 | Score 4 | Score 3 | Score 2 | Score 1 |
| Production (Karnataka) | 0.1 | Ginger | Dry Chillies | Tamarind | Turmeric | Garlic |
| Value (Karnataka) | 0.1 | Dry Chillies | Ginger | Vanilla | Tamarind | Garlic |
| All India share of Karnataka | 0.2 | Vanilla | Tamarind | Ginger | Cinnamon | Pepper |
| Proximity of spice production from Spice Park | 0.3 | Dry Chillies | Vanilla | Garlic | Ginger | Cardamom |
| Export Potential | 0.2 | Dry Chillies | Pepper | Turmeric | Garlic | Ginger |
| Unit value of 1 KG of Spice | 0.1 | Vanilla | Cardamom | Clove | Pepper | Ginger |

The spice composite score is calculated on the basis of their ranking in the matrix and awarded the score accordingly. For example, for the dry chillies, the scoring shall be as follows:

Table 8: Composite Score for dry chillies

| Criteria | Level of Importance | Rank for Dry Chillies | Points for Rank | Score (Importance*Points) |
|---|---------------------|-----------------------|-----------------|---------------------------|
| Production (Karnataka) | 0.1 | 2 | 4 | 0.4 |
| Value (Karnataka) | 0.1 | 1 | 5 | 0.5 |
| All India share of Karnataka | 0.2 | - | 0 | 0.0 |
| Proximity of spice production from Spice Park | 0.3 | 1 | 5 | 1.5 |
| Export Potential | 0.2 | 1 | 5 | 1.0 |
| Unit value of 1 KG of Spice | 0.1 | - | 0 | 0.0 |
| Total Score | | | | 3.4 |

From the above table, it is apparent that dry chillies, vanilla and ginger can be the right combination for this Spice Park.

Table 9: Basis of Selection of target Spice

| Spice | Basis for selection |
|--------------|---|
| Dry Chillies | <ul style="list-style-type: none"> • Second highest production among all spices produced in the State and highest in term of value of spice produced • Huge domestic market • High demand for good quality dry chillies in the export market • Prevailing suitable agro climatic conditions for cultivation • Improve agronomic practices (cultural, post harvest practices) |
| Vanilla | <ul style="list-style-type: none"> • Around one third of all India production from the State alone • Third highest production in terms of value of spice produced in the state • Natural vanillin extracted from the beans has high unit price (price per kg) • Prevalence of suitable soil and climate for the production of vanilla |
| Ginger | <ul style="list-style-type: none"> • Highest production among all spices produced in the State • One fourth of all India production comes from State • High demand for export quality fresh ginger • Can be developed as the production hub for South and Western India |

6.3 Spice Park Configuration

The Spice Park shall have various components which shall include industrial plots with provision of trunk infrastructure for setting up of spice processing units along with provision of common infrastructure facilities like ware house, weigh bridge, R&D centre, Quality Control lab, Steam sterilization unit, R&D Centre, Market Research & Development, Grading and packing hall for dry& wet commodity and internal roads.



Figure 11: Components of the proposed Spice Park

Based on the production of major spices, the specific equipments required for the Spice Park Testing Lab are as per annexure I.

The infrastructure is the key requirement for sustainable industrial operations. Infrastructure requirements for Spice Park could be described under three broad categories, viz. Infrastructure to be built in within spice park boundaries, specific external infrastructure to be developed exclusively for operationalising Spice Park and the other being general urban infrastructure to be developed for the proposed destination.

The Spice Park shall be developed as a service oriented self-contained estate concept. All the necessary infrastructure facilities for Spice Park need to be designed and operated to create an ideal ambience and best environment.

▪ **Internal Infrastructure – General**

The general internal infrastructure and utilities envisaged for the Spice Park are as below:

i. **Site Grading**

Site development and grading works are to be carried out within spice park boundary area only. The extent of site grading depends on the contour. All earthworks have to be carried out with appropriate technical considerations to avoid erosion or possibility of localized slip failure. Provision for temporary surface drainage system has to be made to minimize delay in work progress during wet weather condition.

The filling process has to be implemented in successive layers not exceeding a reasonable thickness of 0.3m. Thereafter, all materials should be compacted in layers by approved means to dry density not less than 90% of the maximum dry density. The depth of each compacted layers shall be compatible with compaction

plant used and shall not be greater than the maximum depth specified for each type of compaction plant. Following the compaction, each layer shall be tested in accordance with relevant Indian Standards, prior to placing the subsequent layer. The extent of the areas in earth fill and cut are considered in two parts - The over all and along the roads.

ii. Boundary Wall and Fencing

Properly designed landscaped entrance plaza with security cabins, gates shall be provided at a suitable location. Individual plots boundary wall and fencing in industrial plots are to be provided by the user industries.

iii. Road

Internal road system shall normally comprise of primary, secondary and local distribution roads. The roadwork shall be carried out strictly as per IRC specifications. A proper hierarchy of roads comprising of primary, secondary and tertiary roads is proposed for the internal road transportation network. The primary roads are the two lanes carriageways in two directions. The Secondary roads and Tertiary roads are single lanes in both directions. All the secondary roads and tertiary roads will not have any central dividers.

Pedestrian walkways are provided for all the categories of roads. All services for drains, sewers, water, power and telecom should be contained within the road reserves. Necessary signage, street name boards, zone guiding maps and visitors guidance map etc shall be positioned at necessary locations like intersections, entrance plaza and at various locations in each zone.

iv. Surface Drainage

All common roads and drains, all walkways & pathways shall be covered and the drains shall have rainwater-harvesting structures. Roads and drains within the individual plots of industrial zone are to be provided by the user industry. The storm water discharge points shall be identified as per contour survey study and general drainage pattern of the site.

v. Effluent, Sewerage collection and treatment System

The objectives of the sewerage system are to cater for the anticipated peak discharge requirements and to treat the waste to the discharge standards required. Sewerage Treatment Plant, Sewage pumping stations are to be covered for development and Sewerage network within the plot area of industrial zone are to be provided by the user industry.

vi. Solid waste management system

Solid waste management is one of the most essential services for maintaining the quality of life in the Industrial area and for ensuring better standards of health and sanitation. Effective measures shall be taken to effectively implement the solid waste management systems in the spice park. The measures to be taken may have to be decided after ascertaining the nature and quantity of solid waste generation after the Spice Park is occupied.

- Other internal infrastructure shall comprise:

- Water supply
- Administrative building
- Canteen/ food outlet
- Security & telecommunication
- Entrance plaza
- Logistics hub
- Sewage treatment plant
- Solid waste management
- Over head tank
- Sub station
- Telecommunication
- Rainwater harvesting
- Signage Walkways

- Plant and Machinery shall comprise:

- Packaging machines
- Decorticator
- Spares
- Machine for cleaning
- Washing Machine
- Belt Drier
- Bin Driers
- Strapping Machine
- Vacuum Packing Machine
- Flaking Machine
- Skin Removing Machines
- Pulveriser
- Boiler
- Steam Sterilization Unit
- Processing Plant
- Dehydration Plant
- Ginger Process Line
- Grading and sorting machines
- Fire fighting
- DG set
- Transportation vehicles
- Potable water filtration & treatment unit
- Assembly equipments
- Installation and Commissioning equipments

6.4 Project Cost

The estimated project cost of the Spice Park is Rs. 28.6 crore. The Bidder has to make due diligence to estimate the exact cost involved in developing the project.

Environmental Management Plan

7. Project Strategy

The major objective and benefit of utilizing Environmental Impact Assessment in project planning is to prevent avoidable losses of environmental resources & values through the development of a judicious and appropriate Environmental Management Plan (EMP). Environmental Management Plan includes protection / mitigation / enhancement measures as well as monitoring.

In the process of planning, it is essential for every project to formulate an EMP to ensure that resources are used with maximum efficiency and that each of the adverse impacts, identified and evaluated as significant be prevented or where required compensated. Possible mitigation measures generally include:

- Changing project sites, routes, production technology, raw materials, disposal methods, engineering designs, safety requirements.
- Introducing pollution controls measures, recycling and conservation of resources, waste treatment, monitoring, phased implementation, personnel training, special social services or community awareness and education.
- Devising compensatory measures for restoration of damaged resources, monetary compensations for project affected persons, off-site programs to enhance some other aspects of the environment or quality of site for the community.

Monitoring is required to evaluate the success or failure (and consequent benefits and losses) of environmental management measures and subsequently to reorient the EMP. Regardless of the quality of an EIA and consequent environmental management measures, they are of limited value unless implemented. As experience has increased in using EIA process for environmental planning the need and justification for periodic monitoring in order to establish meaningful database has become obvious.

This EMP will have to include the following:

- **During Construction phase**

Measures to mitigate the adverse impacts due to the following during the construction phase.

- i. Site preparation
- ii. Sanitation
- iii. Noise
- iv. Construction equipment & waste
- v. Storage of hazardous material/dumping materials
- vi. Site security And Safety

▪ **During Operation Phase**

- i. Operation of various collection, and disposal facilities for emission, wastewater and solid waste.
- ii. Routine monitoring of selected parameters
- iii. Laboratory facilities
- iv. Data handling, reporting, Storage and retrieval facilities, feedback to facilitate future planning.
- v. Emergency action procedures and disaster management procedures
- vi. Manpower for environmental management

7.1 EMP During Construction Phase

The mitigation measures to control adverse impacts during construction phase are discussed below.

▪ **Site Preparation**

The development of site will involve the movement of top soil, removal of trees, shrubs, soils, rocks, debris etc. The site grading operation will also involve stock piling of backfill material. All the distorted slopes need to be stabilized suitably. During dry weather, control of the dust nuisance created by excavation, leveling and transportation activities will be carried out by water sprinkling. It should be ensured that both petrol and diesel powered construction vehicles are properly maintained to minimize smoke in the exhaust emission.

▪ **Sanitation**

The construction work force shall be provided with sufficient sanitation facilities in order to maintain adequate hygienic conditions. Low cost sanitation system like septic tanks / soak pits will be provided. This will be done by provisions in contracts with the contractors.

▪ **Noise**

There will be intense movement of trucks, passenger vehicles, earthmovers etc. in and around the project site. These will create noise and air pollution. Poor visibility, accidents, damages to health of local people etc. are foreseeable consequences. Workers working with heavy equipment generating high noise levels shall have to be provided with ear plugs/ muffs. The maintenance of construction equipment has to be done properly. This will be done by provision in the various contracts with the contractors. Vehicular movement towards the construction sites should be properly regulated to minimize the air and noise pollution consequences. Movement of cargo trucks should be kept minimum during night.

▪ **Construction Equipment and Waste**

The project would involve lot of construction activities for infrastructural facilities and thereby structures are likely to come up on the proposed site and would thus involve the use of construction equipment/instruments. These at times would require on site maintenance and repairing. It will be ensured that both petrol and

diesel powered construction vehicles are properly maintained by the contractors to minimize pollutant emission from exhaust. The vehicle maintenance area will be so located that contamination of surface water bodies by accidental spillage is avoided. Unauthorized dumping of waste oil will be prohibited.

▪ **Storage of Hazardous Material/Dumping Materials**

Petrol, diesel, lubricating oil etc. will be required to be stored at site. These materials will be stored as per stipulated safety standards. Also a lot of material may be generated for disposal during construction activity. These, if disposed off haphazardly can pollute the nearby water bodies adversely. They would increase the accident incidences also. Utmost care will be taken to store these materials at a suitable place and then disposed off at a place in consultation with and as per the guidelines of Karnataka State Pollution Control Board and Central Pollution Control Board.

▪ **Site Security and Safety**

- i. A construction site forms a potentially hazardous environment. To ensure that the surrounding population is not exposed to these hazards, the site will be properly secured by fencing or by construction of a boundary wall and also guards will be posted at entry points.
- ii. First aid facilities should be created at different locations for immediate assistance in case of emergencies and accidents.
- iii. Important information about nearby hospitals, fire stations, police station etc. should be kept available in the first aid centers for speedy action at the time of emergency.
- iv. In case inflammable materials are to be kept at the site, they should be stored and handled in accordance with guidelines of inspectorate of safety and health of the State and Central Governments.
- v. Fire hydrants and extinguishers should be located at all vulnerable sites.

7.2 EMP During Operational Phase

▪ **Operation of various plants and facilities**

It may be pertinent to mention that adherence to recycling of emission and / or waste materials to the following dictum would go a long way to mitigate the pollution hazard due to any industry.

- i. Formulation of In-Plant Waste Minimisation Programmes can save energy and raw materials. Recycling of emission and / or waste materials at source i.e. linked to the production process in the plant is considered important. Water which is a valuable resource used by various industries during their processes can be treated, recycled and reused for some secondary utilities thus effectively conserving the water.
- ii. Research and development programs on clean technologies have underlined that clean technology implementation is an effective mechanism to abate pollution, which works in addition to and independent of the regulatory process.

Furthermore this approach appears to open up possibilities for obtaining other benefits like savings in energy and raw materials.

The following measures are suggested to mitigate the different kind of pollution with regard to this project.

Air Pollution

The air pollution potential of the target list of industries for this spice park looks moderate and would remain mostly limited to work place. There will be less likelihood of any emissions of hazardous or toxic nature into the environment during its operation. In plant control measures would be taken to contain fugitive emissions, so that the concentration of the pollutants in the workplace do not cross the threshold limits. The following general measures would be taken to control the pollution in the proposed Spice Park by individual industrial units.

- i. The allowable emission rate would not be exceeded by individual plant
- ii. Air pollution control technology would be incorporated at the design stage itself
- iii. General housekeeping of each industry would be up to the mark
- iv. Suitable air pollution control equipment if required would be installed by the plant.

Water Pollution

When the development has completed and fully occupied, it is anticipated that the ETP shall be constructed to cater demand. The Wastewater generated in the Spice Park would be treated by the individual industries to the required standards before discharging to common ETP. A portion of ETP outlet can be used for development of green belt and the balance can be reused for general cleaning activities.

Sanitation

All factory premises will have adequate and well-operated sanitation facilities in the project area.

Sludge Disposal

The sources of sludge include sludge from STP and Individual ETP's operated by the Occupant Industries (if required). This sludge can be disposed off by land filling operated by the approved agency of GoK, at a specially earmarked area for the same.

Disposal of Non Hazardous Solid Waste

The scrap materials generated would include packaging materials, scrap wood, cardboard, plastics, unused metal pieces, garbage in the form of papers, cloth fibers, polythene bags, electric components, wire, scrap metal, glass bottles, thermocol etc. Most of the above material is useful. A single external agency of GoK would be employed for whole of the Spice Park area to collect these generated Non Hazardous solid waste, which can be recycled.

The domestic waste generated from Canteen shall be mainly biodegradable in nature. Established scientific disposal of domestic biodegradable waste is in practice and one such method is bio composting. This would involve setting up of a bioconversion plant by the local competent authorities of Karnataka State Government.

The type of industrial waste, biodegradable or non-biodegradable, depends upon the nature of processing and industry. In the spice park the solid waste generated from the industries is expected to be both biodegradable and non-biodegradable in nature.

A comprehensive system needs to be evolved to scientifically dispose the biodegradable waste and inert waste in accordance with MSW 2000 Rules. This activity shall be handled by the local competent authorities of State Government.

Disposal of Hazardous Solid Waste

Units generating hazardous waste will not store, treat, dispose off, transport or offer for transportation without having received consent from central or state pollution control board under Hazardous Waste (Management & Handling) Amendment Rules 2000. The units will require complying with the rules and regulations of the Act. The hazardous industrial waste will be disposed off by individual industries as per the Hazardous Waste (Management and Handling) Amendment Rules, 2000.

Storm water Drainage for the Site

Storm water runoff contains an acknowledgeable pollution through dust, garbage and unprotected solid waste. The storm water discharge points need to be identified based on the terrain and levels of the site. The proposed Spice Park will attempt to retain the drainage / disposal pattern, which exists presently. It is designed to cater for the entire project area by gravity flow. Open rectangular drains are proposed to be provided. The storm water will be isolated to prevent contamination from process spills, floor washings etc. This is essential to prevent contamination of the water bodies into which the storm water would drain. The storm water drainage system would be completely dry during non-monsoon days.

Noise Pollution

The proposed noise control measures include a noise level restriction of 85 dB (A) at 1 m for equipment such as blowers, compressors, pumps and fans. The industries will be asked to maintain the indoor noise levels below the limit of 85 dB (A) prescribed for a distance of 1 meter from any machinery in the factory. This limit is referred as the 'Alert Threshold' value below which there is a negligible risk of any damage to hearing capabilities as a result of 8 hours exposure per day. Industries would be required to implement proper and regular maintenance of machinery. Noise levels in the workplace can also be reduced by engineering control methods and industries would be required to follow measures as detailed below:

- i. Keeping the total noise emission from all noise sources below the base limit in the work area.

- ii. Regulating spacing between noise sources and between sources and operations. In free field conditions the sound level roughly varies with the square of the distance.
- iii. Enclosing the noise sources by a sound reducing i.e. attenuating structure that prevents airborne transmission.
- iv. Reducing structure borne transmission by isolation of the source using resilient mountings
- v. Damping of vibrating metal structures or by replacement with materials such as wood.
- vi. All the operating personnel working in the zone of noise pollution should be provided with earmuffs or earplugs and it is recommended to provide training to the operators to use the same. Reducing reflected noise by use of absorbent materials on surfaces such as roof, walls and floors is recommended.
- vii. Duty hours of employees working in high noise area shall be rotated systematically and proper maintenance to be given to earmuffs and silencers of noise generating equipment.
- viii. Placing attenuating screens between the operations and the source
- ix. Correcting imbalance and vibration by preventive maintenance.
- x. Green belt should be developed around the identified noise generating zones to reduce ambient noise level below the standards prescribed.

Health Care Centre

Medical facilities, first aid centre and health centre near the site, which would be provided by project authorities, will help to protect the health of the project staff.

Green Space

An additional mitigation measure that has a broad definition in as much as it can be used to alleviate a number of adverse impacts due to air and noise emissions is the development of a green space around the facility. It has been proposed to develop green belt in the Spice Park as per the master planning guidelines. These would not only absorb air and water pollutants but also help in arresting noise and soil erosion and creating favourable aesthetic condition. Pollutants in air settle on the ground and vegetation of surrounding area. Plants interact with the pollutants, absorb them and thus remove them from the atmosphere. The interactions of particulate and gaseous pollutants with diverse vegetative surfaces, under conditions of variable micro climatic and pollutant source characteristics are extremely complex. But still the utility of plants in curbing pollution cannot be denied. By their photosynthetic activity, the plants fix carbon dioxide from the atmosphere with concurrent release of oxygen and thus purify the air. Trees also absorb noise and serve as acoustic screen between busy highways, noisy industrial installations and human settlements. The importance of forests in modifying the hydrology of watersheds and in soil conservation has been well recognized. Plants intercept incoming and outgoing radiation, precipitation and wind and thus have a marked effect on the microclimate. They filter dust from the air and absorb it. The importance of plants in reducing the pollution hazard is therefore of considerable significance.

The selection of plant species for the green space is an important feature. It should be based on consideration of soil and agro climatic conditions, the types of

pollutants emitted by the industry, mean wind velocity and dry deposition velocity of plants.

Socio-Economic Environment

- i. It is imperative that a concrete and feasible plan be made to promote employment to the local people with equal opportunities to people.
- ii. Training should be provided to the local people to acquire skill in various fields
- iii. If possible and feasible, the educational facilities to be established at the site should be extended to the nearby villagers.

7.3 Environmental Monitoring

Routine monitoring

After the spice park is in operation, routine monitoring of certain parameters will have to be done to ensure environmental quality control. It may be mentioned that the project proponents would make arrangements for the necessary monitoring programme.

Laboratory Facilities

A laboratory facility will be provided at a suitable site such as the effluent treatment plant site to cater to the routine analysis work required for operation of Effluent / Sewage treatment plant / Solid Waste Facility of Spice Park.

Green Space Maintenance

The Green Space will be maintained under the expert advice of Agriculturist / Horticulturist/Botanist.

Annexure 1: (List of Equipments Required for Spice Park Lab)

| MICROBIOLOGY LABORATORY | | |
|--------------------------------|-------------------------------------|---------------|
| SL.NO. | Equipment Name | Number |
| 1 | Laminar Flow Clean Air Workstation | 1 |
| 2 | Incubator | 2 |
| 3 | Stomacher | 1 |
| 4 | HPLC | 1 |
| 5 | Microscope | 1 |
| 6 | Serological Water Bath | 1 |
| 7 | Centrifuge | 1 |
| 8 | Autoclave | 2 |
| 9 | Oven | 2 |
| 10 | Drier | 1 |
| 11 | Quartz Distillation Unit | 1 |
| 12 | Distillation Unit | 1 |
| 13 | Chilled Water Circulator | 1 |
| 14 | Fridge | 1 |
| 15 | Electronic Balance | 2 |
| RESIDUE LABORATORY | | |
| 16 | HPLC | 2 |
| 17 | GPC | 1 |
| 18 | GC MS/MS | 1 |
| 19 | Atomic Absorption spectrophotometer | 1 |
| 20 | Gas Chromatography | 2 |
| 21 | LC MS/MS | 1 |
| 22 | Cold Water Circulator | 1 |
| 23 | Rotavapor | 1 |
| 24 | Oven | 1 |
| 25 | Electronic Balance | 1 |
| 26 | Fridge | 1 |
| 27 | Freezer | 1 |
| 28 | Shaker | 1 |
| CHEMISTRY LABORATORY | | |
| 29 | UV VIS Spectrophotometer 1 | 1 |
| 30 | HPLC | 1 |
| 31 | Stereoscopic microscope | 1 |
| 32 | Water Activity Meter | 1 |
| 33 | Balance | 2 |
| 34 | Muffle Furnace | 1 |
| 35 | Oven | 1 |
| 36 | Cold Water Circulator | 1 |
| 37 | Fridge | 1 |

Source: Spice Board India

Annexure 2: (Comparison of Spice Parks)

| District | State | Project Cost (Rs.Crores) | Key Spices | Area (Acres) |
|------------|----------------|--------------------------|---|--------------|
| Idukki | Kerala | | Cardamom Pepper | 12.5 |
| Chhindwara | Madhya Pradesh | 20 | Garlic | 8.0 |
| Guntur | Andhra Pradesh | 25 | Chilli | 124.8 |
| Sivagangai | Tamil Nadu | 18 | Turmeric Chillis Medicinal herbs | 73.7 |
| Mehsana | Gujarat | | Fennel Cumin seed Coriander Celery | 27.7 |
| Jhalawar | Rajasthan | | seed spices | 68.3 |

Note: The data above are collected from the published news and documents.