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Dear Readers

Greetings and best wishes!

We are pleased to bring out the 3rd edition of Spices Handbook on the occasion of Gulfood, 2016. The focus of this edition is on “Value added spices and health benefits of spices”. The Handbook is organized into three sections-(1) Value added spices and health benefits of spices; (2) Directory of exporters of spices and (3) Statistics.

I take this opportunity to thank the contributors for their time and expert perspective. I thank all advertisers who have supported and trusted us in this initiative. With their support, we are able to reach out to more people in different parts of the world. Lastly, special thanks to the teams at Foretell – research team, data team, marketing team and the design team - for their efforts.

Export of spices from India has increased substantially in volume (10%) and value (17%) terms in the last 10 years. Chilli, cumin, turmeric and ginger hold a major share (in volume terms) in overall spices exports from India. In the last few years, exports of value added spices (like oils / oleoresin) have increased significantly in both volume terms (15%) and value terms (18%). Presently, demand for value added spices is high in the domestic as well as in the international markets. Spices are in a sweet spot with good demand and reasonably remunerative prices. This is the best time for the stakeholders to prepare for the changes in the regulatory environment in the US and Europe and embrace them for success and sustainability.

World Spice Congress is scheduled towards the end of February 2016. I congratulate the Spices Board of India for the phenomenal work in promoting safe and sustainable spices initiatives around the world and wish them and all the participants a grand success.

Do let us know your views and feedback on the Handbook.

Best wishes and good luck.

G Srivatsava

President

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Table of Content

Intercropping Black Pepper with Coffee Page 6
Chilli Contract Farming in India Page 9
Spice Production in Cambodia Page 12
Vanilla Production and Market Potential Page 16
Sustainability and Business Process Reengineering - The Future Page 20
Drivers of Oleoresin Industry
Cut the Excess Fat with Spices Page 26
Nutraceutical Applications of Spices Page 29
Spices as Flavouring Substances Page 32
Steam Sterilization of Spices Page 36
Recent Developments in Spices Colour Extraction Technology Page 40
Indian Spice Exports- An Overview Page 45
Futures and the Paradigm Shift in Mentha Oil Market Dynamics Page 52
Kampot Pepper Page 56
World Pepper Industry; Present Status and Future Trend Page 60
Indian Dehydrated Vegetable & Spices Industry Page 64
List of Exotic Spices and Herbs Page 67
Black Pepper Price Outlook Page 75
International Spices Exporters Page 76
Indian Spice Exporters Page 78
Spices Exports and Imports - India Page 82
Vietnam Pepper Production and Exports Page 86
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Intercropping Black Pepper with Coffee

Mohan Alvares, Jeelan Estate, India

Black Pepper known as ‘The King of Spices’ has proved to be the king in the agriculture sector. Black Pepper is grown around the world in different countries like Vietnam, Indonesia, Brazil, Malaysia and Srilanka as a monocrop whereas, India is the only country in the world which grows shade grown Black Pepper as an intercrop. The word Pepper is derived from the Sanskrit word 'pipalli'. Pepper is valued for its characteristics such as a spicy aroma with a hot, pungent, biting taste. It is a flowering vine in the piperaceae family, where its fruit is dried and used as a spice and seasoning. Black Pepper is native to South India and is also cultivated in tropical regions.

India is one of the largest producer and exporter of Black Pepper in the world. It produces about 50,000 - 70,000 MT, 85% of which is consumed domestically and 15% is exported. In India, Pepper is cultivated as an intercrop with Coffee. Coffee is a brewed drink prepared from roasted coffee beans. The Coffee plant which is native to subtropical Africa is cultivated in over 70 countries. In 2014-15, Brazil produced 32% of the worlds Coffee whereas India produced just 4%.

Intercropping is a multiple cropping practices involving growing two or more crops in proximity. The most common goal of intercropping is to produce a greater yield on a given piece of land by making use of resources that would otherwise not be utilised by a single crop. India cultivates all its Coffee under a well-defined two-tier mixed shade canopy, comprising evergreen leguminous trees. Nearly 50 different types of shade trees are found in Coffee plantations. Shade trees are planted to provide natural shade to Coffee and are used as a support tree for Pepper vines. The concept of mono crop Pepper cultivation in India is very limited. As Pepper is a vine, it requires a suitable support tree as a standard, whereas, in other producing countries non-living standards like wooden poles and brick columns are used. Shade trees prevent soil erosion, enrich the soil by recycling nutrients from deeper layers, protect the coffee plant from seasonal fluctuations in temperature and play host to diverse flora and fauna.

Although cultivation of associate crops in Coffee is in vogue, systematic studies to find out suitable crop combinations with a high cost:benefit ratio was initiated by the Coffee Board of India. Arabica and Robusta Coffee intercropped with Pepper revealed a benefit of 310% and 229% respectively. This indicates that Black Pepper is the most compatible crop in Coffee plantations. A socio-economic survey on the impact of diversification in Coffee plantations revealed that in Arabica Plantations the income from other crops represented 12% in Karnataka and 37% in Tamil Nadu regions. In Robusta plantations, the income from intercrops constituted around 40% in Karnataka and 26% in Kerala regions (Reddy and Raghuramulu, 2004).

In Karnataka, Arabica and Robusta Coffee varieties are grown and a majority of the growers have cultivated Black Pepper as an intercrop. It is evident from yields that, growing Coffee alone is not viable for generating more income from a unit area. This indicates that when there is a lower price for Coffee, some of the intercrops such as Pepper, Arecaanut, Vanilla, Oranges, Aromatic and Medicinal plants etc. become a key source to help generate a higher net income when grown along with Coffee. Cost of cultivation of the intercrop is almost negligible as some of the common cultural operations such as weeding, irrigation, fertilizer and others are commonly shared together and this brings down the total cost of cultivation when Black Pepper is grown as an intercrop with Coffee.

The model in order to make each square meter of soil bring the highest benefit to farmers is to intercrop Black Pepper with Coffee by letting Pepper climb on the shade trees and wind-break trees. This utilises soil and area effectively and contributes to protect the ecological environment. This is an intelligent cultivation system that creates the basis for sustainable Coffee.
production in environment, society and economy. When Black Pepper is intercropped in Coffee plantations, the following characteristics of nutrition, disease, ecology and economics are evident:

- Pepper vines do not compete in nutrient with Coffee trees because Pepper vines are planted under the roots of shade trees and forest trees.
- Pepper vines do not compete with Coffee trees for light because they have a cylindrical canopy and grow upwards.
- The reproduction, flowering and moisture stress periods for both Coffee and Pepper are identical.
- Pepper is harvested after Coffee so there is no competition of labour and drying yard space.
- Pests and diseases on Coffee and shade trees are generally not harmful to Pepper and vice versa.
- Black Pepper can be preserved for many years without damage. Some farmers warehouse them waiting for a higher price.
- On the economic side, in an acre of Coffee, there are about 100-200 shade trees. If Pepper is planted on 75% of the shade trees and if one Pepper vine yields about 3 kgs of dried pepper (some pepper vines yield 7-10 kgs), farmers can get about 200 to 600 kgs of dry Black Pepper per acre, substantially augmenting the income per acre.

Global climate change has tremendously affected the resources of farmers in developing countries resulting in severe agricultural stress. The price of Black Pepper in the global and domestic markets fluctuates greatly. Intercropping is one of the options that protect farmers from vagaries of weather, pest and diseases/market fluctuations.

Black Pepper grown as a monocrop does not fully utilise the natural resources such as soil, space and light. When Black Pepper is grown as a mono crop, the light energy reaches the ground and gets wasted. Pests and Diseases in monocrop Black Pepper plantations spread extremely rapidly and the entire plantation has a very high risk of being wiped out.

Intercropping ensures efficient utilisation of light and other resources, reduces soil erosion, suppresses weed growth and helps to maintain greater stability in crop yields and guarantees higher returns. Intercropping of Black Pepper in Coffee plantations leads to utilisation of horizontal and vertical space, nutrients, moisture and solar radiation. Cultivation of intercrops is certainly a way of enhancing farm level income and generation of employment opportunities. Intercropping also positively influences the soil nutrient status. In general, nitrogen and potash content in intercropped plots is significantly higher than a mono crop of only Coffee or Black Pepper.

### Average cost of cultivation of a Coffee plantation intercropped with Black Pepper

Arabica is calculated at Rs. 192 per kg, Robusta at Rs. 222 per kg and Pepper at Rs. 600 per kg. The prices are as of January 2016 and fluctuate from time to time.

However, a key limitation to be borne in mind is that the present varieties of Black Pepper grow but do not produce a good yield at elevations above 1200 MSL. This significantly reduces the area for intercropping Black Pepper in Coffee plantations as several areas are above 1200 MSL.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Crop</th>
<th>Avg. Yields / acre</th>
<th>Income in Rs.</th>
<th>Expenses in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arabica</td>
<td>350 kg</td>
<td>Rs. 67,200</td>
<td>Rs. 60,000</td>
</tr>
<tr>
<td>2</td>
<td>Robusta</td>
<td>550 kg</td>
<td>Rs. 67,100</td>
<td>Rs. 50,000</td>
</tr>
<tr>
<td>3</td>
<td>Pepper</td>
<td>No mono crop in India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Arabica + Pepper</td>
<td>375 kg + 100 kg</td>
<td>Rs. 1,32,000</td>
<td>Rs. 75,000</td>
</tr>
<tr>
<td>5</td>
<td>Robusta + Pepper</td>
<td>500 kg + 150 kg</td>
<td>Rs. 1,51,000</td>
<td>Rs. 70,000</td>
</tr>
</tbody>
</table>

Thus intercropping Black Pepper in Coffee provides additional returns, employment opportunities, enables better utilisation of resources and creates a sustainable livelihood for the farmer.
Intercropping Arabica Coffee with Black Pepper

Intercropping Robusta Coffee with Black Pepper

Field visit to Robusta Coffee Plantation Intercropped with Black Pepper
Chilli Contract Farming in India
Vinayaraj K S, HOD- Contract Farming, Sa Rawther Spices (P) Ltd

Food is the basic need of Human being, and Spices add taste to the food we eat. From time immemorial Spices are the prized possession human beings possessed. Being highly valued commodity, adulteration of Spices was common phenomenon throughout the world.

In 1905 Upton Sinclair wrote a book called, “The Jungle”. The book revealed the true and sad condition of Hygiene in the American sausage factories, where the food products used to get contaminated with the dead poisoned rats and flesh of unfortunate slave labours who fell into machinery. The Jungle had a major impact on the American public. Congress passed the Pure Food and Drug Act in 1906, and for the first time it became illegal to sell contaminated (adulterated) food.

By 1980 concept of Food safety had become matured in the Europe and many research was conducted on the Harmful effects of Pesticides and Mycotoxins. By the year 1996 AVT and VKL company in India pioneered the concept of Chilli contract farming to control Pesticide residues and Aflatoxin residues in chillies cultivated in India.

At Present contract Farming of chillies is done in India by around 8-10 companies and the estimated quantity of chillies procured is around 25,000 to 30,000 MT. The contract farming is done in different models. That can be broadly classified as below:

- Direct Farming
- Vendor based contract Farming.
- Subagent/Lead farmer led contract farming.
- Vendors developed contract Farming.
- NGOS or Farmers organisations led contract farming.

Direct Contract Farming
In this model of contract Farming the farmer network is developed by the company officials and there will be no intermediates between the Company and Farmers. Except in certain cases a company may appoint local person with minimum commission for disbursement of
the cash during payment.

**Merits:**
- Good control on Crop cultivation and pesticide usage
- More Confidence on the Traceability.
- Lesser intermediaries leads to better transfer of technology.
- Availability of PR & Afla free chillies at reasonably lower prices.

**Demerits:**
- Difficult to establish due to local level hurdles.
- Difficulty in on-time payment. Companies have longer lead time for payment processing.
- Risk of covering the targeted quantity of material.
- Delay in decision making process
- Procurement of Material

**Vendor Based Contract Farming**
In this model of contract farming the company will outsource the contract farming to a vendor, who is responsible for all the activity right from the selection of farmers, convincing the farmer to cultivate according to EU standards, procurement and supply to factory gate. But company will appoint an agronomist or a field staff to oversee the project

**Merits:**
- For companies it is a hassle free process.
- Vendor will have to ensure delivery of contracted quintity of material.
- Decision making on procurement etc., is easy due to local contact etc.

**Demerits:**
- Delivery prices are generally higher than other models as Vendor Profit will add to the RM price.
- Fool proof traceability implementation is not easy.
- Bargaining capacity of the vendor on price will be higher than the farmers.

**Subagent/Lead Farmer led Contract Farming:** This model is an inter mediatory of the earlier two models, where a farmer/local vendor is groomed to carry out the functions carried out by the vendor. Here company will employ higher number of employees to monitor the cultivation and to support the lead farmer.

**Merits:**
- This model is efficient model which will eliminate the demerits of the earlier model.
- Traceability can be implemented efficiently.
- We can get EU specification material at competitive pricing.

**Demerits:**
- Training the farmer to conduct all the vendors’ duty is quite cumbersome.
- Lead farmer has limited capability to invest.
- Vendor Developed Contract Farming: - Few of the enterprising vendors have developed contract farming by themselves. They generally would not do any prior contract with any companies. But would be selling the quantities based on the price bids from different companies during season.

**NGOS or Farmers Organisations led Contract Farming:** There has been attempts by different NGOS and Farmer co-operative to start contract farming by themselves. But due to many problems like no forward linkages, lack of professionalism, thrust etc the module is not working efficiently. But in future if the farmers, companies take initiative then it would be a benefit to complete supply chain.

**Merits:**
- Farmer realise better margins, which will motivate
them to take extra efforts and interest in producing quality material.
- Efficient Traceability can be implemented
- It is easy to communicate and train all the new regulations of EU regulations.

Demerits:
- Difficult to teach farmers to maintain the co-operative groups and conduct all the job of the vendor efficiently.
- Limited investment capacity from the farmer groups.

Potential of Chillies Export from India:- India is the only major source of hot chillies in the world and is also bestowed with cheap and skilled labour force compared to other origins.

But still India has not efficiently captured the world market compared to its potential. This has not harnessed because we have been cultivating only the medium hot and high pungent chillies. Indian seed breeders have not concentrated on other flavour chillies like Jalapenos, Habanero, Birds eye chilli and Paprika. If we are able to produce the above mentioned different types of chilli then we can capture many of the nish markets.

India has not been able to convince the importing countries on the food safety measures taken. This has also led to premium customers preferring other origins like Spain, Mexico even if the price is high

Upcoming Trends and Regulations from EU:-

The restriction on the pesticides and fungicides are ever evolving based on the research of toxicity of agro chemicals. The restriction is becoming stringent every day and the detection levels of the machines are also increasing day by day.

Allergens are the upcoming challenge for the food companies across Europe and US. Though majority of the allergens are not grown in the geographies where chilli is cultivated. We need to take extra care and reinforce the buyer confidence on our products.

As many of the big multinational FMCG companies in Europe have declared that they would be buying only sustainable products by 2020. India needs be geared up for the challenge. Conserving environment would also be helpful for the farmers and whole of the community.

Way forward:-

All the stake holders like farmers, seeds companies, Government, Spice Board, Spice exporting companies have to work towards sustainability of the sector by doing research on .
- Determinate chillies so that mechanisation of chilli cultivation will become reality.
- The Government should establish Research centre for chillies and other spices in line with NRC on Grapes. Because the pesticide recommendation that is been given to IPM farmers is based on the crude guess work from the Agronomists of Contract Farming departments of the Exporting companies and also this is leading to denial of many important chemicals for cultivation. India need to do systematic research on the residue levels that comes due to spraying of different chemicals at different concentrations.
- Promotion of Advance cultivation methods like Drip irrigation, Fertigation, community drying, mechanical drying etc.
- Sustainable certifications cost should be rationalised, so that even small and marginal farmers can afford certification.
Spice Production in Cambodia


Department of Industrial Crop (DoIC),
General Directorate of Agriculture (GDA),
Ministry of Agriculture, Forestry and Fisheries (MAFF)

Abstract
In Cambodia, spice crops have many species, but most spices which have been grown by farmers are used domestically. The spice crops are currently marked as a major important crop and has played an important role in contributing rural household cash incomes, but crops mostly grown by farmers are mainly for domestic use and exports. Some important spice crops like black pepper and chili are planted in order to exports to the international markets. These crops provide livelihood security to large number of people in Cambodia. Spice products are commonly used in food and flavoring industries and also utilized for traditional medicine. The decision making of farmers in increasing of planted area of the crop heavily depend on high market demand and relatively high price. However, spice crops with low demand, farmers generally grow around their home in a small pie of land for domestic consumption and the remaining are to support the local market to generate additional source of cash incomes to support their living. These data and information from the article can potentially be used as a basic for further development and extension technology for sustainable production of spice crop production in Cambodia.

Key words: Spices, Pepper, Production Constraint, and Crop Management

1. Crop grown, area and production

Table 1. Planted area, Harvested area, Production, and Yield of spices crop in Cambodia, 2015.

<table>
<thead>
<tr>
<th>Major spice crops</th>
<th>Planted area (ha)</th>
<th>Harvested area (ha)</th>
<th>Production (Ton)</th>
<th>Yield (Ton ha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepper (2015)</td>
<td>4,645</td>
<td>1,744</td>
<td>9,800</td>
<td>2.12</td>
</tr>
<tr>
<td>Pepper (2014)</td>
<td>2,236</td>
<td>1,350</td>
<td>7,500</td>
<td>3.28</td>
</tr>
<tr>
<td>Chili</td>
<td>365</td>
<td>365</td>
<td>750</td>
<td>2.08</td>
</tr>
<tr>
<td>Turmeric</td>
<td>50</td>
<td>50</td>
<td>1,500</td>
<td>30.00</td>
</tr>
<tr>
<td>Ginger</td>
<td>30</td>
<td>30</td>
<td>900</td>
<td>30.00</td>
</tr>
<tr>
<td>Pepper longum L</td>
<td>25</td>
<td>25</td>
<td>50</td>
<td>2.00</td>
</tr>
<tr>
<td>Afghan</td>
<td>25</td>
<td>25</td>
<td>75</td>
<td>30.00</td>
</tr>
<tr>
<td>Lemon grass</td>
<td>20</td>
<td>20</td>
<td>200</td>
<td>10.00</td>
</tr>
</tbody>
</table>

Source: GDA, 2015

The data in Table 1 clearly indicates that among seven important spice crops, both black pepper and hot chili were grown in large area compared to other spice crops. The harvested area of pepper increased remarkably from 1, 350 ha in 2014 to 1, 744 ha in 2015, while the production increased from 7,500 tons in 2014 to 9, 800 tons in 2015 with average yield increased slightly from 5.56 tons ha⁻¹ in 2014 to 5.62 tons ha⁻¹ in 2015. For Chili, the harvested area was 365 ha while the production was 730 tons with the average crop yield of 2 tons ha⁻¹ (Table 1). Increase in yield reflected in expansion of area under pepper cultivation. Farmers started cultivating pepper in new areas where the soil is still quite fertile, farmers have used appropriate planting technology and proper crop management. In addition to this, many farmers also adopted more suitable higher
SCFE Extracted oleoresins, essential oils, spice extracts, botanical extracts & oils and natural carotenoids
yielding varieties for their farm.

Table 2. Harvested area, Production, and Yield of few spice crops of Cambodia from 2010-2015.

<table>
<thead>
<tr>
<th>Year</th>
<th>Peppers harvested area (ha)</th>
<th>Harvested area (ha)</th>
<th>Peppers planted area (ha)</th>
<th>Peppers production (t)</th>
<th>Peppers yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>450</td>
<td>861</td>
<td>320</td>
<td>1,250</td>
<td>3.9</td>
</tr>
<tr>
<td>2011</td>
<td>360</td>
<td>750</td>
<td>1,500</td>
<td>4,500</td>
<td>3.0</td>
</tr>
<tr>
<td>2012</td>
<td>270</td>
<td>540</td>
<td>2,000</td>
<td>9,000</td>
<td>4.5</td>
</tr>
<tr>
<td>2013</td>
<td>180</td>
<td>360</td>
<td>1,000</td>
<td>3,000</td>
<td>3.0</td>
</tr>
<tr>
<td>2014</td>
<td>90</td>
<td>180</td>
<td>1,500</td>
<td>4,500</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Source: MAFF, 2015 (Department Planning and Statistic)

According to data obtained from two sources (MAFF and FAO) in table 2 shows that the harvested area of pepper have increased significantly over the past six years (2010-2015) from 320 ha in 2010 to 1,744 ha in 2015 while the production also increased remarkably from 1,250 tons in 2010 to 9,800 tons in 2015 with average yield increased from 3.9 tons ha-1 in 2010 to 5.62 tons ha-1 in 2015 (Table 2).

The harvested area of chili (dry) derived from FAO website. Area under chili cultivation also increased from 12,680 ha in 2010 to 13,000 ha in 2012 and production from 11,600 tons in 2010 to 12,000 tons in 2012 with the average yield from 0.91 tons ha-1 in 2010 to 0.92 tons ha-1 in 2012 (FAO, 2016).

2. Cambodian spices exporting countries
As a well organized market Cambodia has exported spices to many countries. Cambodia has exported pepper to European Union, America, Taiwan, Japan, Korea, China, and Thailand (GDA, 2015) and Chili to Thailand and China.

3. Problem faced by spices growing farmers
Small scale farmers do not have enough capital to invest in growing pepper; they usually grow in small area from 200-300 plants per household. If the pepper growers who have a bit more capital, they are able to grow them up to 500 plants a household. Presently, private companies growing pepper in this area with large number of plants of 50,000 plants to 100,000 plants. Therefore, there is a strong competition between small-scale farmers and the private companies in terms of no market availability and price fluctuation.

crop generally faces constraints as indicated below:
- The price is unstable from year to year depending on the market demand, one year price going up and another year dropping down. The price is commonly determined by middleman or brokers.
- The utilization of appropriate technology and optimum agricultural inputs for spice crops production are still limited.
- Serious problem with insect, pests and diseases occurring on blackpepper in Cambodia.
- Insufficient irrigation systems faced by farmers for crop growing, especially during the dry season and shortage of capital to purchase agricultural inputs such as chemical and organic fertilizers.
- Difficulty in searching market opportunity for selling the crop products and the products generally quoted low price at the time of harvesting.
- Lack of human resources, extension agencies and technicians to deliver/transfer new innovative technology to farmers.

4. Technology development
To improve technology and development in farm condition, important points need to be considered mainly on following strategy:
- To enhance the new technology development for increasing spice crop productivity in sustainable manner through introducing new high yielding and good quality crop variety, crop management and pre and post-harvest technology.
- To develop suitable packaging technology to the growing condition of farmers for increasing crop productivity and sustainable crop system with a better cash income.
- To increase capacity and knowledge of management, researchers and extension workers to enhance the development and extension of improved technology.

5. Future plan for increasing spice production
In order to increase and enhance the productivity of spice production in Cambodia and for exporting it in the immediate future, there are several major points to be addressed as follows:
- Wide co-operation in promoting spice sector among farmers, public and private sectors.
- Strengthening and expanding collaboration with development partner, national and international research and development agencies, provincial department of agriculture, national and international NGO as well as farmers for implementing research and development activities based on spice production in Cambodia.
• Promoting and expanding the investment in this sector.
• Establishing farmer’s co-operation, therefore farmers are able to help each other for solving problems that they are facing.

6. Conclusions
The available data and critical information of this article can be used as references for other studies. Outputs and outcomes of the main script indicate that pepper growers regard pepper highly important spice crop as compared to other potential spice crops. This information can also be used as a basic for development and transfer of new technology for sustainable production of spice crops in Cambodia.

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The author would like to take this rare opportunity to express profound thanks to the government staff of the Provincial Department of Agriculture, Siem Reap and Kandal, for providing the secondary data of spice crop in his region. Special acknowledgement and thanks are extended to Mr. Yin Chansothy, Oil Fiber, and AddictiveCrops Office for his close cooperation by providing vital information and secondary data. We are also grateful and thanks are extended to Mr. Ung Sopheap, Senior Researcher of DoIC and Mr. Ban Samrach for his kind assistance in English editing of this article.

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Vanilla Production and Market Potential

Dr. Varanashi Krishna Moorthy , Varanashi Research Foundation

Vanilla is grown in tropical countries but mostly consumed in European countries and North America.

**Mixed farming – ecologically and economically stable:** To make vanilla cultivation more sustainable it is better to grow it as a mixed crop using Glyricidia, Erythrina, arecanut, coconut, teak, Casuarinas, cashew nut or even natural forest trees as support/shade trees. Vanilla plants are multiplied by vegetative method using healthy cutting of 4-6 nodes or rooted cutting from the nursery. This could be planted near support plant.

**Semi-degraded compost ideal**
Vanilla roots need good aeration. It is a perennial crop and needs a humus rich soil, continuous supply of nutrients. So, semi-degraded and fibrous compost from coir pith, areca nut husk, forest leaves is ideal. These materials do not contain enough nutrients. Hence, compost needs to be prepared by addition of appropriate N,P,K-rich materials. For composting, any suitable method could be followed. However, VRF method of composting is most advanced and easy to adopt.

**Planting and manuring**
Beginning of the monsoon (June) is most ideal time for planting of vanilla. At the time of planting, about 10-15 kg of semi-degraded compost needs to be applied to a thickness of 2-3 cm around the support plant having vanilla vine. Repeat the application of 15 kg in the month of September-October. In case of mature vines, 20-30 kg of compost application is to be given when the pollination of the flowers begins in February-March. The quantity of manure mentioned earlier could be reduced at low rainfall areas where the leaching loss is less. The manure could be also given in 2-3 split doses. Use of oil cakes like castor cake/neem cake also helps in boosting the growth. However, these are rich in nutrients and so the quantity should be restricted to ¼ to ½ kg per application and one or two applications per year during summer months. Vanilla needs regular irrigation during dry season. Mist irrigation is most suitable.
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Organic Exotic Seasonings
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Nutrient Spray boosts the growth
The aerial roots of vanilla absorb the nutrients when given as spray. Foliage also absorbs them. During summer months, nutrient spray can be given once in 7-10 days. Cow urine diluted 10 times can be sprayed alternatively or in its absence, vermi-wash, compost tea (extract) are other useful organic preparations. Biogas slurry diluted 1:4 could be used to feed the root zone once in 30-60 days. Manuring and nutrient spraying just before heavy rains and also after September are to be avoided in order that the plants are enabled to shift to reproductive phase.

Organic and mixed farming – Minimum pest and diseases
In organic Farms, the pest problems are less compared to conventional farms. Birds and other natural predators control most of the insect pests. In addition, mechanical control also needs to be practiced. For fungal problems, like Phytophthora rot during rainy season 1% Bordeaux spray is to be adopted. Fusarium and Colletotrichum are other two serious problems reported in late 2000. Effective measures are still under development.

Harvesting and Processing
Vanilla plants mature in 3 years and start producing flowers after the rainy season. Beans are ready for harvest in six to nine months after pollination. The beans are harvested one by one when they are fully-grown and as they begin to ripen. At this stage, beans change their colour from dark green to light green with yellow tinge. Immature beans produce an inferior product and, if picked too late, the beans start splitting. Processing and curing should commence within a week of harvest. Processing involves sorting and grading, cleaning, killing in hot water at 65°C, sweating, sun drying followed by sweating, slow drying and conditioning. Depending on the grade the reduction in weight from green to conditioned beans ranges from 4.5:1 to 6:1. The whole process takes about 3-4 months. After conditioning, beans are re-graded as gourmet beans or dried industrial (powdered/extraction grade) beans. Gourmet beans fetch highest price.

Vanilla Production: World scenario
Until the mid-19th century, Mexico was the chief producer of vanilla. In 1819, however, French entrepreneurs shipped vanilla fruits to the islands of Réunion and Mauritius in hopes of producing vanilla there. After Edmond Albius discovered how to pollinate the flowers quickly by hand, the pods began to thrive. Soon, the tropical orchids were sent from Réunion Island to the Comoros Islands, Seychelles and Madagascar, along with instructions for pollinating them. By 1898, Madagascar, Réunion, and the Comoros Islands produced 200 metric tons of vanilla beans, about 80% of world production. According to the United Nations Food and Agriculture Organisation, Madagascar and Indonesia are currently responsible for the vast majority of the world’s Bourbon vanilla production and 58% of the world total vanilla fruit production.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Production (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Madagascar</td>
<td>3,500</td>
</tr>
<tr>
<td>2</td>
<td>Indonesia</td>
<td>3,400</td>
</tr>
<tr>
<td>3</td>
<td>China</td>
<td>1,350</td>
</tr>
<tr>
<td>4</td>
<td>Papua New Guinea</td>
<td>400</td>
</tr>
<tr>
<td>5</td>
<td>Mexico</td>
<td>390</td>
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<td>6</td>
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<td>7</td>
<td>Tonga</td>
<td>202</td>
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<tr>
<td>8</td>
<td>Uganda</td>
<td>170</td>
</tr>
<tr>
<td>9</td>
<td>French Polynesia</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>Comoros</td>
<td>42</td>
</tr>
</tbody>
</table>

Source: UN Food & Agriculture Organization

Vanilla demand and price
The market price of vanilla rose dramatically in the late 1970s after a tropical cyclone ravaged key croplands. Prices remained high through the early 1980s despite the introduction of Indonesian vanilla. In the mid-1980s, the cartel that had controlled vanilla prices and distribution since its creation in 1930 disbanded. Prices dropped 70% over the next few years, to nearly US$20 per kilogram; prices rose sharply again after tropical cyclone ‘Hudah’ struck Madagascar in April 2000. The cyclone, political instability, and poor weather in the third year drove vanilla prices to an astonishing US$500 per kilogram in 2004, bringing new countries into the vanilla industry. A good crop, coupled with decreased demand caused by the production of imitation vanilla, pushed the market price down to the $40 per kilogram range in the middle of 2005. By 2010, prices were down to US$20/per kilo. We have already seen the price for industrial beans triple in the past 3 years. Although this
may seem severe to buyers, vanilla prices have simply recovered from the 2006 – 2011 period when prices unsustainably low.

It is very likely that worldwide vanilla production will fall short of demand in 2015 so pressure will remain on prices. Historically speaking today’s prices for vanilla are quite reasonable and one could even argue cheaper compared to 20 years ago. Given the projected shortfall in production there is still plenty of room for further increases if demand does not abate somewhat.

Madagascar accounts for much of the global production of vanilla. Mexico, once the leading producer of natural vanilla with an annual yield of 500 tons, produced only 10 tons of vanilla in 2006, which increased to 390 tons in 2012. An estimated 95% of “vanilla” products are flavored with artificial vanillin derived from lignin instead of vanilla fruits.

Vanilla: Indian Scenario
In India vanilla cultivation was introduced during 1835 by British near Shringeri, Karnataka State. But except in a few blocks no serious effort was done. During 1985 a few enthusiastic farmers made an effort to reintroduce the crop. Post 2000 price hike made a rapid area increase in cultivation in Kerala, Karnataka and Tamil Nadu. The increased, price, area and production resulted in dramatic price fall. Farmers lost interest. Further, Fusarium rot a devastating disease has nearly wiped out the production in India. From a peak estimated production of about 300 ton in about 4000 ha., the present production of processed vanilla is estimated to be around 6-8 tons annually in India.

Vanilla prices soared in 2003-04 to touch Rs 20,000 per kg for cured or processed beans. Later, a bumper crop in Madagascar saw Indian processed beans prices dropping to less than Rs 600 per kg. Vanilla prices were languishing below Rs 35 per kg for green beans.

In 2015 due to shortage and increased demand the prices for cured bean has touched Rs. 6500/- and green bean 800 to 1000. This may not be anywhere near to earlier peak but attractive enough to go for cultivation.

Reference

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http://www.austhachcanada.com/april-2014/
https://en.wikipedia.org/wiki/Vanilla
Sustainability and Business Process Reengineering - The Future Drivers of Oleoresin Industry

Jainendran.G, Freelancer in the Area of Spices and Oleoresins

History of spice trading perfectly matches with the history of modern age, May 21st 1498, the first ever sea voyage from Europe to India (Kozhikode, Kerala) by Vasco Da Gama and his crew. As the part of spreading Europe’s trade network across seven seas, India’s fortune was started with pepper from Kerala – A typical economics linked with politics over hundreds of years which had highly controlled and restricted supply with great demand. The ingredient value streams in all major spices fall into Essential oils and Oleoresins apart from some soluble and insoluble fibres. Evolution and commercialisation of spice ingredients took another 500 years, supported by Indian R & D and technology, mostly triggered by the global demand of black pepper and its value added derivatives, and rapidly got extended to all other spices. Even at a time when ground spices and pastes where the choice of kitchens and industrial seasonings, the preference for extracted oleoresins emerged as a way to minimise cost and supply chain challenges to export markets which in turn shifted to stability, consistency and standardisation. Further in 21st century, the processing preferences and focus shifted towards residues and contaminant control. The way ahead is with cost efficiency and sustainability.

By definition, Oleoresins are the active ingredients in spices that provide the flavour and taste, a natural mixture of essential oils and non-volatile matter such as resins, fixed oils and so on .In current scenario oleoresins are further segmented in to natural pigments, essential oils, speciality extracts and oleoresins from spices, herbs, fruits and vegetables by various process which includes solvent extraction, steam distillation, super critical extraction and enzyme-assisted extraction. Majority of the spice extracts are used by flavouring and seasoning industry; while an increasing consumption trend is noticed in the natural food colour, nutraceuticals, food preservation, cosmetics and similar domains.

**PROCESSES**

Major processing methods employed by the extraction industry are illustrated.

Steam distillation – Cleaned spices are pre-processed and distilled in food grade stainless steel vessels ,the active volatiles are separated after cooling the oil-hot water mixture based on specific gravity either by gravity or centrifugal separation techniques.
Steam distillation plant

Solvent extraction – Pre-processed raw materials are exposed to approved organic solvents in a confined vessel or continuous extractor, followed by removal of solvents by appropriate distillation methods. The residual solvent levels are carefully controlled to trace levels as set by respective regulations.

Supercritical extraction- It is an extraction technology of modern era in which carbon dioxide gas at supercritical state is used as the solvent. This method achieves extracts completely free of organic solvent and residues. It is processed at relatively lower temperatures and achieves almost true flavour profile of the spices being processed.

Enzyme assisted extraction – An enhanced form of solvent extraction, in which active enzymes – native or derived – were used to break cellulolytic material, exposing the active ingredients to solvents quickly, is being practiced in some cases for optimising process efficiency, yields and product rheology.

Supercritical fluid extraction plant

CURRENT BUSINESS SCENERIO
Global market size of 40 Million USD with a growth of minimum 3-5 % YOY, in which India contributes 8% YOY in exports where as domestic demand grows at 20-25 % due to the change in food habit trends and increased spending levels and rapid urbanisation. Leading product range includes 7000 MT of Paprika, 5000 MT (Basis of 10%Capsaisin) of Capsicum,1300 MT of Black pepper and 300 MT of Turmeric (95% Curcumin),India is historically leading with the first position in volume and value of global oleoresin supply, recent trends and eco system are not much favourable for India as a processing hub, due to the migration of processing facilities to other countries where the raw material
is produced. China’s entry to Oleoresin market mainly in Paprika, Capsaicin and Marigold oleoresin leads to healthy competition for economies of scale in major volume groups, still the right raw material, knowledge pool and ability to meet new tailor made requirements by the support of research & development, innovation and skilled process force are the key driving factors that retains India in first position.

FUTURE
Backward integration of seasoning and flavouring companies through mergers, acquisitions and strategic partnerships in India and forward integration of oleoresin companies in the world seasoning and flavouring are going to be the key business drivers for the future. In a summary, consolidation of Oleoresins and flavouring business community can only sustain the industry growth at a reasonable rate – while the other benefit of this is going to be the economies of scale.

Agriculture sustainability initiatives and business process reengineering are the two core areas which the future of industry is dependent on.

1. SUSTAINABILITY
The challenge is majorly with small and marginal farmers in spice growing regions which predominantly cater the entire spice trade, collaboration with bodies like SSI (Sustainable Spice Initiative) and WSO (World spice Organisation) will be able to take up such challenges.
All leading players have initiated addressing the regulatory requirements related to residues and contaminants control, farmer awareness training programs on soil testing, over dosage in fertigation, application of right molecules in right time, proper post harvesting practices and traceability. Government mechanism in spice producing countries are not very active in bringing controls over the un-approved pesticides, improving yields and inculcating a culture of good agricultural practices.

Recently, the innovations happening in linking Agriculture, farm mechanisation and Information Technology is going to be the controlling factor in the area of agriculture sustainability not only for meeting regulatory requirements of end-user nations but also for sustaining quality produce and farming culture in spice producing countries.

2. BUSINESS PROCESS REENGINEERING

Only a minor portion of profit realisation is being reinvested in the focus areas for future apart from capacity expansion and focusing the manufacturing in the raw material growing regions. It's high time for the existing operators to move out of the box for cost reduction and improving efficiency.

a. Raw material sourcing through agents and aggregators: Sourcing through agents and aggregators need to be shifted to more of farmers cooperatives and associations facilitates by IT enabled platforms.

b. Active ingredient loss in the case of temperature sensitive raw materials in the pre-processing and extraction process to be minimised

c. Right scientific and process engineering developments to be established in the areas of particle size, extraction efficiency and wastage minimisation

d. Effective By product streams utilisation and market exploration by meeting regulatory requirements need to be explored.

e. Development of high yielding varieties of raw materials and development of proper agricultural practices in association with researchers, academicians, private seed producers and universities.

f. Reverse engineering by coordinating with buyer community to standardise final product which will avoid inventory and supply chain challenges.

g. Currently the manufacturing process depend on manual involvement to a great degree, which need to be more standardised for consistency by automation.

h. Applications of artificial intelligence in product development, testing comparison, process and product development

i. Digitalisation in B2B marketing and sales functions as the next generation opportunity.

2020 AND BEYOND

Leading oleoresin businesses have already started investing in bulk contract farming systems with sustainability focus around the globe and started moving their manufacturing facilities to growing areas, Sustainability and key process change initiatives with effective utilisation of bye product streams are facilitating superior product quality with minimum cost. After the major consolidation to avoid one stage operating margin, eventually the oleoresin industry will be the part of flavour / seasoning industry. However, small time processors and new ventures would also survive depending on how well they differentiate themselves against the large processors, in terms of raw materials development and innovation.

###

![Diagram of supply chain](image)
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Cut the Excess Fat with Spices
Parvathi Sarma, Dietary Incharge, Mallya Hospital, Bangalore

Spicy secret:
The Secret behind tasty food is adding different varieties of spices to it. Not only to enhance taste, it can also play a big crucial role in maintaining good health. Especially spices can play a big role in reducing weight. Some of the spices are particularly helpful addition to pantry when you’re on a mission to slim down.

Spice will speed up the metabolism:
Spices helps to maintain a healthy body weight by increasing metabolism, and shrinking the fat tissue. Metabolism is the amount of energy or calories needed by your body to maintain itself throughout the day. Everyone’s metabolism is affected by their body composition so that People with more muscles will have higher metabolism, while those who are less muscular have a lower metabolism. So when the metabolism is increased due to consumption of spices, automatically calories will be burnt which will help in reducing the body weight.

Some of the spices are listed below which can give the best result in reducing weight

Turmeric
Turmeric can be found in most of the Indian dishes. Turmeric has got anti-cancer properties. Turmeric is the most powerful substance for healthy fat loss. The fat-vanquishing nature of turmeric and curcumin has even generated significant interest within the mainstream medical establishment. You don’t need to purchase expensive pharmaceutical drugs to enjoy the benefits of turmeric spice. Research is finding high quality liquid extracts of turmeric as well as the actual food product itself are readily available and powerful to fight obesity. For weight loss it plays a role in differentiation of fat cells, stopping them from forming or reducing their size.

Garlic
Garlic is an anti inflammatory and natural anti biotic that has been used for thousands of years for medicinal purposes. Now it can also be known as fat burner. In fact researchers in Korea discovered that garlic reduced body weight in oversized mice that were fed high fat diets 2 or 5 pods garlic over seven weeks. From preventing heart disease and cancer to fighting off infections, researchers are finding encouraging results with garlic. Garlic has been found to lower the levels of LDL cholesterol. The effects of good cholesterol could be seen in in short term, about three months when taken daily. It may help you
to dissolve clots that can lead to heart stokes.

**Chilli**

A string of recent studies by researchers in Canada suggest that a key chemical contained in chilies could boost your body's ability to burn fat and curb your appetite in the bargain. It increases the body's energy expenditure and also causes you to eat more slowly, which may mean you eat less overall. Studies have also suggested that eating foods containing capsaicinoids may cause you to crave more plant-based foods.

**Mustard Seeds**

The mustard seeds or powder is known to warm the eater. Such warming generally makes you sweat, which helps the body to flush out any toxins. This gives the body a better ability to concentrate on breaking down fat. Mustard is also high in dietary fiber which helps in digestion and helps you feel fuller for long time. Scientists at England’s Oxford Institute found that by eating one tablespoon of mustard can boost the metabolism by up to 25 percent for several hours after eating. Mustard has good amount of selenium, fiber, protein, phosphorus, manganese, magnesium, iron and calcium. They also contain 30 calories in two teaspoons. Mustard paste can be enjoyed as a condiment on sandwiches, mixed into homemade salad dressings, or used as a glaze on fish or chicken.

**Coriander Seeds**

Coriander is a very tasty herb, less expensive version of pepto-Bismol. Derived from cilantro seeds, coriander contains unique blend oils that can work on digestive muscle relaxation. Commonly used in Indian recipes and also used in salads and soups. It is difficult to live without coriander after you learned how to use it. Recent studies proved that daily consumption of coriander juice can also burn extra fat cells and reduce the weight.

**Cinnamon**

“Research has found that cinnamon helps to move glucose into cells, thereby curbing insulin surges after a meal” Says Lenchewski. Adding antioxidant seasoning to a high fat meal decreases insulin response by 20 percent and also reduces triglyceride levels. Sprinkle cinnamon in your coffee, tea, oats for a smaller waist, fewer cravings and appetite control. Cinnamon apparently helps digest your food properly. That means it will be probably extract more nutrients for body from a given amount of food and so you don’t have to eat excessively to do so. It doesn’t seem to have the property to burn away the fat cells, but it could possibly prevent the accumulation of fatty cells.

**Ginger**

Ginger comes on the top of the list of effective natural home remedies. Ginger has been shown to increase the metabolic rate and decrease appetite. It helps with digestion. Consuming ginger everyday will affect on cholesterol levels are often attributed to obesity among people. Ginger also helps
in improving body immunity. Ginger contains nutrients like chromium, magnesium and zinc which can prevent common problems like fever, chills and excessive sweat. Adding ginger to tea, fruit juices, salads will increase not only the taste but also health.

Black pepper

A recent study, published in ACS’ journal of agricultural food chemistry shows the main substance in black pepper known as piperine, this can stop the formation of fat cells. Piperine is the substance in black pepper responsible for its pungency. Black pepper has been shown to raise in the body temperature and increase metabolism. Black pepper also has been found to have antioxidant and anti bacterial properties. Adding little pepper powder in cooked food will increase the taste as well as it helps in fat reduction in the body. Adding a little spice in the form of black pepper now has more benefit than just the taste aspect.

Cumin

Recent research studies have proved that cumin seeds are helpful in reducing weight. Using cumin can lose weight quicker and influence the body’s fat amount by reducing harmful lipids. And also it helps in better digestion and absorption by breaking large molecules into small molecules. Cumin is very rich in iron that helps in problems like anemia, general weakness and tiredness. It helps in high sugar since it contains high fiber. People who use cumin everyday can burn fat three times faster than normal. One tea spoon of cumin intake for three months can make a big change in one’s weight reduction.

Cardamom

Cardamom is one of the world’s ancient spices. Cardamom is stimulant and digestive. Indian Ayurveda has explained the properties of cardamom helps to burn fat faster. Usually indigestion leads to weight gain and slows down the metabolism. Cardamom helps to digest the food properly and increase the metabolism. Everyday adding half tea spoon of cardamom powder tea can improve the flavor of tea and reduce the body weight.

Adding a little spice to one’s food, not only improves its tastes but also one’s health. Spices play a major role in weight reduction. Therefore, try to include different spices while cooking food, preparing juices, tea, salads, etc, so that the taste of food and one health, both improve.
Nutraceutical Applications of Spices
Antony Kunjachan, Executive Director- Arjuna Natural Extracts Ltd

“Let food be thy medicine and medicine be thy food”, Hippocrates was quoted as saying about 2,500 years ago is certainly the tenet of today.

Dr. Stephen DeFelice, founder and chairman of the Foundation for Innovative Medicine coined the word Nutraceutical by combining the words Nutrition and Pharmaceutical. According to Dr. DeFelice, “a nutraceutical can be defined as “a food or part of a food that provides medical or health benefits, including the prevention and/or treatment of a disease.” Nutraceuticals are typically considered natural as they are derived from food substances and not from chemical reproductions of natural food substances. Spices are considered mostly as culinary delights and essentials. Many magical properties have been attributed to spices.

While enjoying favourite dishes at home or complimenting a chef on the wonderful meal he has cooked, how many of us know about the importance of spices other than as a flavoring agent?

Spices occupy a major position in the Indian culinary scene. They are regularly used in the kitchen to add aroma and taste to food. The uses of spices have never been confined to the kitchen alone. Spices have various effects when used in foods. Not only do they impart flavor, pungency and color characteristics, they also possess antioxidant, antimicrobial, pharmaceutical and nutritional properties.

Major spices have nutraceutical and pharmaceutical values. Minor spices like curry leaf, pomegranate, long pepper, tamarind etc are key ingredients in indigenous systems of medicine and house- hold remedies for various common ailments. The medicinal values of many herbal spices are well known- curcumin in turmeric or vitamin C in green chillies, for instance. Menthol, a sold white natural substance that smells and tastes like mint is actually derived from mint. Menthol can help to clear your nose when you have a cold. The lip-smacking fish curry flavored with the dried rind of the Malabar tamarind or “kodampuli” is a Kerala delicacy.

Although “kodampuli” was not listed in the traditional Ayurvedic medicine of ancient India, it had widespread usage among the old folk as herbal remedies. The astringent and antiseptic properties of the fruit of this tropical tree make it an effective mouth wash for weak and spongy gums.

Tamarind is widely used as a spice all through the Indian sub-continent in curries, sauces, chutneys and some beverages. Other than a rich source of sugars, pulp contains substantial amount of Vitamin C, tartaric acid and pectin.

This acidic fruit, the richest natural source of hydroxycitric acid is proved to regulate obesity in humans. The anti-obesity potency of hydroxycitric acid has been clinically screened and confirmed; the acid controls lipid and cholesterol synthesis in human systems and also helps reducing food intake habits.

The curry leaf is highly esteemed for its aromatic leaves which find a place in chutneys, fresh salads and other South Indian delicacies. The leaf is good to promote appetite and digestion. It is found to destroy pathogenic
worms, improves voice, stimulates digestion and destroys concocted poisons in our body. It heals wounds and has well proven sugar-regulatory potential. It is well known that dietary sugar promotes cancer. Energy drinks like Oxystorm devoid of dietary sugar, a branded product made from red spinach is a real boon to athletes or sports person.

Long pepper is used as a spice in pickles and preserves. The fruit has a pepper-like taste and produces saliva when taken. The active ingredients are piperine and pipilartine that give long pepper its medicinal value.

Pomegranate has long been cherished as food and medicine.

The uses of minor spices extend beyond taste and flavour. They have acted down the years as digestive stimulants and they have antioxidants. The demand for spices is increasing globally, for culinary purposes due to changed food habits and as constituents in various pharmaceutical preparations of different systems of medicine.

In Malayalam almanac Karkidakam (Mid July-Mid august) is that time of the year when your body requires extra strength. Traditional broths with spices have medicinal properties that will help cope with the season's ailments.

It is that time of season change of the year when the body has not completely recovered from the heat of the summer and is weak and vulnerable to diseases.

One distinctive feature of this season is “Karkidaka Kanji” (Medicinal porridge), a spicy mix of rice and medicinal herbs. It is a therapeutic, tasty rice gruel that is prepared and consumed fresh on all the days of this month.

But the exciting challenge is the conversion of what is in the domain of traditional knowledge to commercial products like anti-oxidants and anti-microbials. Traditional practice based on “grandmother’s belief” has to be supported by science. Under this circumstances, Research Institutions and Companies have a major role to play. They may come forward for developing new products and new uses of spices including pharmaceuticals, nutraceuticals, cosmetics and products of “wellness industry”. In this connection, it is worth mentioning the tailored product BCM95, the natural product from turmeric with maximum bioavailable curcumin developed by world-class innovators like Arjuna that finds many applications.

Nutraceuticals are playing a significant role in correcting and maintaining normal physiological functions and thus good health. The nutraceutical market is growing globally due to the current population and the health trends. A majority who undergoes “Karkidaka chikilsa” (treatment in the month of “Karkidakam”) by dint of consciousness about health are youngsters. They undergo detoxification because of the pressures of modern, largely sedentary, lifestyles. These youngsters aim at preventing lifestyle illnesses such as back aches by taking precautionary steps. Some people even massage their body with herbal powders.

Various organizations, institutions and temples in the rural and urban areas in Kerala are busy distributing the kit for preparing ‘Karkidaka Kanji’ (medicinal porridge). The kit contains fenugreek, cinnamon, cumin, Aashaali (Garden Cress), Kurunthotti (Mahabala or Sida retusa) etc. The kit comes in different flavours including “Jeeraka kanji”, “dhashapushpa kanji”, “uluva kanji”, “njavara kanji” and “wheat kanji”. There is good demand for the product among people who want to follow the tradition and are unaware of the herbs and medicinal plants that go into it. While it may now have become difficult to find the herbs in the courtyards of houses, branded ‘Karkidaka kanji’ ready mix is available in the market. Many pharma companies are marketing ready-to-cook kits of this.

The food products used as nutraceuticals can be categorized as dietary fibre, prebiotics, probiotics, antioxidants and other different types of herbal/natural foods. These nutraceuticals help in combating some of the major health problems of the era such as obesity, cardiovascular diseases, cancer, osteoporosis, arthritis, diabetes, cholesterol etc.

On the whole, better understanding the health benefits of nutraceuticals made it to take a lead in the health segment in the present era, in which the food industry has become a research oriented sector. Consumers, being frustrated with the expensive, high-tech, symptomatic disease-treatment in the modern medicines, sliding them into debt, distress and discomfort are seeking complementary, affordable and sensible alternative beneficial products and the red tape of managed care makes nutraceuticals more and more appealing.
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Spices as Flavouring Substances

Smitha Sunder, Flavour Creation - Savoury, Flavours Division, Symrise Private Limited,

Definition of Spices
The term Spices refers to the plants or parts of plants (fresh and dried) roots, seeds, flowers, buds, fruits and bark and leaves (woody plants) used to enhance the flavour or taste of human food. Herbs are part of Spices that are essentially obtained from the leaves of herbaceous plants. In some cases, both herb and spice can come from the same plant. Eg: Dill seed is a spice and the stalk of the plant is an herb.

Usage of Spices and Herbs
The primary purpose of using spices and herbs is for Flavouring Food. Spices generally have a strong flavour and hence a small quantity is required for usage. Spices and herbs also act as preservatives and antioxidants. Some spices also have medicinal properties, like turmeric has anti-inflammatory and anti-fungal properties.

Spices are usually dried before being used to season foods. Unlike herbs, they are grown in more tropical countries. We have listed the sensory properties of some spices at the end of this article.

Despite the above clarification, according to the American Spice Trade Association (ASTA), spices are defined as “any dried plant product used primarily for seasoning purposes”. This really broadens the definition of spices, allowing it to include herbs, dehydrated veggies, spice blends and spice seeds.

Below is a table listing 5 each of herbs and spices, along with their reported nutritional/health benefits.

<table>
<thead>
<tr>
<th>Herb</th>
<th>Nutrition</th>
<th>Spice</th>
<th>Nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basil</td>
<td>Rich in Vitamin A and K. Assists with combatting bowel inflammation and rheumatoid arthritis</td>
<td>Cinnamon</td>
<td>Lowers blood sugar levels, LDL (bad) cholesterol and triglycerides especially in people with type 2 diabetes</td>
</tr>
<tr>
<td>Mint</td>
<td>Helps with digestion and asthma</td>
<td>Ginger</td>
<td>Can stop nausea and may also relieve heartburn and bloating</td>
</tr>
<tr>
<td>Oregano</td>
<td>Assists with inflammation</td>
<td>Chilli</td>
<td>Contains capsaicin which puts the heat in chilies, may lower the risk of skin and colon cancers, shown to suppress appetite and boost metabolism</td>
</tr>
<tr>
<td>Parsley</td>
<td>Protects against rheumatoid arthritis, antioxidant-rich, fights cancer, high in vitamin C and iron.</td>
<td>Cloves</td>
<td>Have antibacterial, antiviral, antifungal and antiseptic properties; they are known for relieving flatulence and can actually help promote good digestion as well as metabolism</td>
</tr>
<tr>
<td>Thyme</td>
<td>Contains the oil, thymol, especially helpful for chest and respiratory problems, also acts as an antiseptic and disinfectant.</td>
<td>Mustard seeds</td>
<td>Contain phytonutrient compounds that protect against cancers of the gastrointestinal tract; believed to reduce the severity of asthma</td>
</tr>
</tbody>
</table>
Spice Mixes and Seasoning Blends
Spice mixes are blended spices or herbs. A certain combination of herbs or spices is blended in a particular ratio, given a name and used in many different recipes or in one recipe that is used frequently, it is convenient to blend these ingredients beforehand. Blends such as Curry powder, Garam masala, Chinese Five spice, Jerk Spice and Za’atar are traditionally sold pre-made are also available for ready usage. These spice mixes can also be prepared at home for later use.

Seasoning is a mixture of spices and herbs along with Salt and other ingredients like condiments intended for direct usage in food preparations. Eg: An Italian seasoning (mixture of Salt, herbs, garlic and chilli) can be directly sprinkled over pasta or pizza for an enhanced taste experience.

Liquid Blends / Ingredients
Spice Extracts (oleoresins) and Essential oils are used in flavouring of various applications to provide the characteristic taste and mouthfeel of a spice or herb. They are highly potent in nature as they contain high amounts of volatile oils.

An essential oil is a concentrated hydrophobic liquid containing volatile oils from plants. Essential oils are also known as Volatile oils and ethereal oils. Essential oil is derived from the sense that it contains the essence of the plant from where it is extracted. Essential oils are generally extracted by steam distillation, expression, solvent extraction, absolute oil extraction, resin tapping and cold pressing. They are used in perfumes, cosmetics, soaps and other flavouring products for different end-use application. Eg: Spearmint oil, Coriander seed oil, basil oil, lavendour oil etc.

Oleoresins are pure extracts of spices and herbs. They are generally in a semi-solid form that contain both volatile and non-volatile Flavour components. Oleoresins provide both aroma and mouthfeel characteristic of the ground spice with a faster flavour release. Eg: Black Pepper Oleoresin, Paprika Oleoresin, Chilli Oleoresin, Ginger Oleoresin etc.

Spice Oleoresins, extracts and essential oils are integral part of Flavouring Preparation for Sweet and Savoury Category. They are classified under Natural Flavouring substances. Natural flavoring substances are extracted from plants, herbs and spices, animals, or microbial fermentations. Essential oils and oleoresins that are created by solvent extract with the solvent removed, herbs, spices and sweetness are all natural flavourings. Natural flavourings can be either used in their natural form or processed form for human consumption.

Constituents of Spices and Herbs
The constituent of Spices is a very vast topic and a lot of information is available in various books and articles. We will look at the information at an abstract level only here.

The constituents of spices which are important from a flavouring property perspective are essentially secondary metabolism products and hence not vital for the growth of plant. In some cases the flavourful aroma molecules are by-products of metabolism and play a role in attracting pollinators or drive away herbivorous animals. It is paradoxical that some herbs and plants are grown and spread world-wide for enhancing the taste of food is intended to discourage the consumption of the plant.

Although there is a large number of classes of plant constituents known, most plants contain only few of them. It is frequently observed that botanically related plants contain similar or even the same constituents; this also explains why spices appear clustered in some plant families, while other families do not contain any aromatic plant. A small fraction
of the biochemical found in plants is relevant for the quality of the spiciness and providing the flavour. Some classes of compounds are unpleasant and not safe for consumption.

The classes of compounds those are most important for flavouring is listed below

(1) **Terpenes:** This is by far the most important class of aroma compounds. Many of them exhibit an aromatic flavour similar to that of turpentine and they are generally described as terpenic in Flavour language.

Terpenes are secondary metabolic products, having low boiling points and strong aroma. The name terpene is used for hydrocarbons made of isoprene units, but frequently extended to derivatives of these which are called as Terpene Derivatives (Alcohols, esters, Carboxylic acid, Esters and others) Eg: Thymol - This is a natural monoterpene phenol derivative of cymene. Thymol is a white crystalline material that provides a pleasant aromatic odour and has strong antiseptic properties. This occurs in high quantities naturally in Ajwain, Thyme, Oregano and other herbs and spices in small quantities. Eg: Thymol which is responsible for aroma of thyme.

(2) **Phenylpropanoids:** Similar to terpenes, phenylpropanoids are frequently volatile compounds that can be extracted during the process of distillation. Eg: cinnamic acid in cinnamon, eugenol(cloves), Vanillin (Vanilla beans) and coumarin (tonka beans). Phenylpropanoids are made of two classes of compounds – Diarylheptanoides and alkaloids.

Diarylheptanoides are a group of non-volatile compounds found in the rhizomes of spices of ginger family. They are responsible for the pungent taste of these spices (Zingerone) and also for the colour of turmeric (curcumin).

(3) **Glycosides:** Glycosides is a large and inhomogenous group of biochemical compounds that consists of two parts – a carbohydrate (sugar) and a non-sugar part termed as aglycon. Glycosides are generally non-volatile and less flavourful, but the aglycon itself may be volatile and can show up in the essential oil owing to the weak chemical bonding to the sugar part.

(2) Eg(ii) AllylThiocyanate (AITC) responsible for pungent taste of mustard and horseradish.

(ii) Coumarin and Vanillin are stored as glycosides in their plants and the aroma compounds are generated only after drying and post-harvest processing.

(4) **Sulfur Compounds:** This class of compounds includes Thiols, Sulfides, di and poly sulphides that contains Sulfur in low oxidation state and emanate a strong unpleasant smell. These are prominently present in Onion, Garlic and Asafoetida.

(5) **Tannins** : Tannins are inhomogenous class of biochemical compounds that are found in almost all plant families. They provide astringent and unpleasant taste and hence not much valued in Spice Plants. High tannin content is considered as bad quality (eg cassia) and in very small levels has some culinary merits (rosemary, sumac)

(6) **Fruit Acids:** This includes some di and tricarboxylic acids which purely provides acidic sour taste to lemon, orange, pomegranate and other fruits.

(7) **Lipids:** Lipids are commonly known as fats if solid and as oils if liquid. Lipids are an efficient form to store energy and they mainly occur in the seed part of the plant. Vegetable oils and fats are composed of triglycerides.

(8) **Sensory Characters of Spices**

<table>
<thead>
<tr>
<th>Flavour Characteristics</th>
<th>Spices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliaceous</td>
<td>Onion, Chives, Shallot, Leeks and Garlic</td>
</tr>
<tr>
<td>Bitter</td>
<td>Celery seed, fenugreek, hop, nutmeg, mace, saffron.</td>
</tr>
<tr>
<td>Fragrant and Floral</td>
<td>Basil</td>
</tr>
<tr>
<td>Herbaceous</td>
<td>Dill, parsley, rosemary, sage, thyme, oregano</td>
</tr>
<tr>
<td>Licorice-like</td>
<td>Anise, chervil, fennel, star-anise</td>
</tr>
<tr>
<td>Nut like</td>
<td>Poppy seed, sesame seed</td>
</tr>
<tr>
<td>Pungent and hot</td>
<td>Capsicum, chilly, ginger, black pepper, horseradish, mustard.</td>
</tr>
</tbody>
</table>
Spice Powders, essential oils, oleoresins and extracts are important raw materials used in Flavour Creation as they not only provide complexity, mouthfeel, and richness but also contribute immensely in enhancing the taste of food. Spice processing companies are offering unique profiles like roasted cumin, fried chilli, toasted garlic/onion and others that can be used to create unique and signature profiles like that has been cooked in a restaurant or recreate a profile that is similar to home cooking. With trends like All Natural, Health and Wellness, Clean-label foods catching up worldwide there will be a lot of opportunities to combine science and art to create a whole range of Flavours and blends for different end-use applications.

### CODEX Current Year Meetings

<table>
<thead>
<tr>
<th>Meetings</th>
<th>Places</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codex Committee on Food Import and Export Inspection and Certification Systems</td>
<td>Melbourne, Australia</td>
<td>06/02/2016</td>
<td>12/02/2016</td>
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<tr>
<td>Codex Committee on Methods of Analysis and Sampling</td>
<td>Budapest, Hungary</td>
<td>22/02/2016</td>
<td>26/02/2016</td>
</tr>
<tr>
<td>Codex Committee on Food Additives</td>
<td>Xi’an, China</td>
<td>14/03/2016</td>
<td>18/03/2016</td>
</tr>
<tr>
<td>Codex Committee on Contaminants in Foods</td>
<td>Rotterdam, Netherlands</td>
<td>04/04/2016</td>
<td>08/04/2016</td>
</tr>
<tr>
<td>Codex Committee on General Principles</td>
<td>Paris, France</td>
<td>11/04/2016</td>
<td>15/04/2016</td>
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<tr>
<td>Codex Committee on Pesticide Residues</td>
<td>Chongqing, China</td>
<td>25/04/2016</td>
<td>29/04/2016</td>
</tr>
<tr>
<td>Codex Committee on Food Labelling</td>
<td>Ottawa, Canada</td>
<td>09/05/2016</td>
<td>13/05/2016</td>
</tr>
<tr>
<td>Executive Committee of the Codex Alimentarius Commission</td>
<td>Rome, Italy</td>
<td>20/06/2016</td>
<td>23/06/2016</td>
</tr>
<tr>
<td>Codex Alimentarius Commission</td>
<td>Rome, Italy</td>
<td>27/06/2016</td>
<td>01/07/2016</td>
</tr>
</tbody>
</table>
Steam Sterilization of Spices
By Ventilex

Is there anybody who does not know the famous Indian food the aromatic, spiced and delicious biryani, the healthy Vietnamese Pho noodle soup, the roast beef and Yorkshire pudding as England’s traditional Sunday lunch or even the Hungarian goulash soup with a lot of paprika powder in it?

If we open a cookery book all recipes contain different spices like black pepper, chili, ginger, turmeric, coriander, cumin, cinnamon, cloves, salt etc., etc.

We are not always in a position to buy fresh spices and ingredients. Thus, when we buy pre-packaged products, we rightfully expect that their smell, taste, color, and aroma should be identical with those of the original product and that they should be produced, stored and transported in a proper and safeway.

During the long journey from the plantation to our dining table, spices might become contaminated with bacteria or fungi.

Yeast and molds are the principal types of microorganisms that cause food spoilage and food-borne illnesses. Foods may be contaminated by microorganisms at any time during harvest, storage, processing, distribution, handling, or preparation. The primary sources of microbial contamination are soil, air, animal feed, animal hides and intestines, plant surfaces, sewage, and food processing machinery or utensils.

Spore forming bacteria, including pathogens such as Bacillus cereus, Clostridium perfringens, and Clostridium botulinum, as well as non-spore forming vegetative cells of microorganisms such as Escherichia coli, Staphylococcus aureus, and Salmonella spp. have been found in spices and dried aromatic herbs.

Historically, Salmonella is the most common bacterial pathogen associated with product recalls.
Various food treatment and food preservation methods are used to destroy microorganisms that cause food decay and threaten health as well as to inactivate enzymes in tissue.

Sterilization is killing or removal of all microorganisms, including bacteria, bacterial spores, fungi and viruses.

Sterilization can be done by physical treatment (heat, radiation or filtration) or chemical agents.

Each treatment destroys microorganisms in a unique manner and with a different degree of effectiveness.

Heat sterilization with dry or moist heat method is the classical way. It is fast, effective, non-toxic, friendly to the environment and economical. Various forms of steam treatment are currently in use and the choice between saturated, dry, and superheated steam depends on the technology and product to be treated. Steam is most commonly used to treat whole seed spices such as white and black pepper. Steam is more effective than dry heat for microbial reduction because of the heat transfer capabilities of moist heat.

Irradiation is a process by which certain foods may be exposed to radiant energy. Radiation sterilization with gamma, X-ray and pure energy rays emitted from Cobalt-60 and similar in many ways to microwaves, or by accelerated electrons, commonly known as electron beam (E-beam) irradiation. Governmental regulation of irradiation of food varies considerably from country to country.

Chemical sterilization is based on chemical reaction method. Ethylene oxide (EtO) or propylene oxide (PPO), when applied either under vacuum or under pressure, with or without an inert gas diluent, can kill bacteria, yeast, mold and pathogens without the need for high temperatures. Ethylene oxide, in particular, has been widely applied in the treatment of spices, gums, starch, flour, yeast, and milk. The commonly used ethylene oxide (EtO) has been banned in the European Community as well as several countries outside of Europe because the risk for cancer development in the human body. EtO gas is highly flammable, toxic, carcinogenic and it can also cause genetic damage (mutagenic).

Why steam sterilization?
Steam sterilization is most widely used method due to the fact that steam is ideal gas as it is non-toxic, safe, it is cost-effective, rapid and there is unlimited supply.

The continuous steam sterilizing process results in simultaneous reduction of the microbiological load and the ample inactivation of enzymes in spices, herbs and seeds.

Steam offers the following advantages:
• Hence the system concept complies with the condition that the product is subjected to the minimum heat load for adequate decontamination with a minimum adverse effect on flavor, color and loss of volatile oil
• Fastest possible way of product heating to an exact preset temperature
• Steam condenses on the product and provides the water activity required for effective sterilization while the steam that condensed on the product surface will protect the product against burning
• The steam condensed on the product enables flash cooling of the product when it leaves the sterilizer via a self-cleaning rotary discharge valve and meets a large flow of sterile air in the fluid bed dryer/cooler, to evaporate spontaneously
• The process is controlled and monitored by a PLC
• Quick microbe kill times

Disadvantages:
• Not for materials that are sensitive to heat or moisture
• Steam generating system is needed
Because most spices are grown in developing countries near the tropics, the spice industry, like other agricultural products industries, must be vigilant to protect against the possible presence of pathogens and extraneous matter in the spices that are delivered to the shops or imported into different countries.

**Steam sterilizing: killing bacteria naturally**

Our Ventilex ‘Continuous Steam Sterilizing’ System has been developed for the natural decontamination of herbs and spices based on steam. It produces products that are safe for human consumption and retains their external characteristics such as shape and color, or properties like taste and aroma. Our processing method especially maintains the excellent quality of the end product for the consumer.

**The process is easy:** after brief exposure to steam the product is dried and cooled. Although the idea is relatively simple, the working of a continuous system that can process both powders and whole spices is unique. The continuous system is closed and uses self-cleaning rotary valves for product input and output. The system is operated by a central control panel which is validated for data logging. The sophisticated design enables the processing of both ground and whole products. Our Ventilex ‘Continuous Steam Sterilizing’ System has proved its value for industry. It is successfully used to process chilies, chili powders, bell peppers, cloves, garlic and numerous other seeds and spices.

The Ventilex ‘Continuous Steam Sterilizing’ System is ideal for High Temperature - Short Time (H.T.S.T) decontamination of spices, herbs, seeds, and other organic materials. The H.T.S.T. process exposes contaminated material to saturated steam for a very short time, then dries and cools the product.

It can be seen as a simple idea, but this is one of the most practical and effective methods for treating products in this industry. The continuous system treats powders next to whole spices, which is a unique feature of the Ventilex System.

**Benefits of the Ventilex ‘Steam Sterilization System’ include:**

- A natural, renewable process that utilizes steam
- Continuous sterilization of bacteria and pathogens
- Deactivation of enzymes
- High throughput
- Sanitary Clean-in-Place (CIP) design
- Repeatable, reproducible and verifiable process
- PLC controlled with menu structure to reduce the influence of operators

**Effective Decontamination of herbs and spices with the Ventilex ‘Continuous Steam Sterilizer’**

The use of steam is ideal as it is natural, non-toxic, cost-effective and in unlimited supply. Steam offers many advantages including, the fastest possible way of heating product to an exact preset temperature, condensation on the product and provides the water activity required for effective sterilization while protecting the product against overheating and burning. The steam condensed on the product also enables flash cooling of the product when it leaves the sterilizer and is returned to pretreatment specifications in an integrated Ventilex Dryer / Cooler system.

Our system can be used to process chili powders, whole and ground pepper, paprika, garlic, cloves, and a variety of herbs, seeds, and other spices. As a result, many of the world’s largest spice processing companies have already selected the Ventilex ‘Continuous Steam Sterilizer’.

Steam treatment can be applied to whole or ground spices. Treating the whole product is technically easy, and can be done in the growing/exporting country. In this case, the post-treatment handling needs to follow strict hygiene rules in order to limit the risks of recontamination during grinding, handling, storage and packing. Treatment of ground spices has the advantage of limiting the risk of recontamination, as the product can be packed right after it is treated. That is also important to establish stringent worker hygiene controls.
Anyhow it is important that stringent hygiene working is practiced as it is also necessary that the environment of the processing machines is a hygienic environment.

Making food products safe is our specialty. Offering customized pathogen and bacteria reduction technologies for spices and food ingredients, we’ll help you to meet regulatory standards, while making your products safer for consumers.

Ventilex has decades of experience in steam sterilizing food product, we offer a customized system which meets your requirements, and the system fulfills the moderns hygienic standard.

Due to the long lifetime of our system the Ventilex 'Steam Sterilization System' is the best cost effective solution.

References:
1. www.ventilex.com
3. Clean, safe spices - Guidance from the American Spice Trade Association. 2011
Recent Developments in Spices Colour Extraction Technology

Preeti Birwal*, Vikram Simha H.V.*, Anu kumari** * and Arun Kumar

*ICAR-National Dairy Research Institute, Bengaluru.
**Assistant Professor of Processing and Food Engineering, UAS, Raichur.

Colour is a major attribute to the quality, affecting the appearance and acceptance of food product. Past two decades, however, consumers have become increasingly aware of the ingredients in their food as they require food to be as `natural' as possible. The manufacturers of food, beverages, cosmetics and pharmaceuticals are responding to the growing wave of consumer resistance and legislative limitations set for products containing chemical additives. As a consequence of the increased demand of natural colorant from the industries, there is a renewed interest in the research on the composition and recovery of natural food colours particularly, Synthetic colour resulting in health apprehension due to presence of toxic compounds.

Spices and herbs are the major natural source of colour possessing opportunity in the international market as they are known not only for their aroma and flavour, but also for their medicinal values. Both spices and herbs have been used for centuries in traditional medical system to cure various kinds of illnesses such as common cold, cough, diabetes and cancers. From times immemorial, colorants, and flavours have been used in food. Over the years, numerous procedures have been proposed for the isolation of aromatic compounds and colors from plant materials.

Table 1: Colour components of spices

<table>
<thead>
<tr>
<th>Class of Pigments</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthocyanins (Red to Blue)</td>
<td>Green sweet Pepper, Green Chilli</td>
</tr>
<tr>
<td>Carotenoids (Yellow to Red)</td>
<td>Paprika, Saffron, Red pepper</td>
</tr>
<tr>
<td>Flavones and Chalcones (Orange)</td>
<td>Chilli Pepper</td>
</tr>
</tbody>
</table>

Before synthetic colours came into existence, spices like chilli, saffron, turmeric, capsicum, cardamom, black pepper, caraway, celery, cinnamon, clove, coriander, daphne, fennel, ginger, hyssop, juniper, lavender, oregano, pennyroyal, red pepper, safflower, sage, turmeric, and vanilla etc., were used in Indian cuisines to add colour. The extractable colour in the food industry is usually expressed in ASTA (American Spice Trade Association) unit value for paprika or chilli pepper plant material and in Colour Units (CU) for their extracts. One ASTA unit is approximately equivalent to 40 CU.

Innovative Method for Extraction of colour:

The traditional technique of solvent extraction of plant materials are based on the correct choice of solvents and the use of heat or/and agitation to increase the solubility of the desired compounds and improve the mass transfer. The traditional method used to extract the dyestuffs from all other plants mentioned earlier, where the plant material is added directly to the dye bath. This has been used by dyers for centuries and is still used by many dyers in north eastern states of India. But problems like separate unit in textile, in-efficiency, low density product output, and non-suitability for most colouring spices leads to development of new improved methods. Efficient extraction of the dye is very important for standardization and optimization of dyes. New approaches are:

a) Soxhlet extraction
b) Supercritical Fluid Extraction (SFE)
Steam Decontamination

- Steam sterilisers and pasteurisers
- No chemicals / radiation free
- 5 log kills are typical
- Minimal loss of flavor, color and volatile oil
- Recipe based (for processing multiple products)
- Automatic sanitary Clean-in-Place (CIP)
- Hygienic design, high quality finish
- Data Logging / Traceability
- Low energy consumption

www.steam-sterilizer.net
www.ventilex.com
c) Subcritical Water Extraction (SWE)
d) Ultrasound-Assisted Extraction (UAE)
e) Microwave Assisted Extraction (MAE)
f) Enzyme Treated Extraction

Soxhlet Extraction
Plant parts are put into thistle of soxhlet extractor and solvent like dichloromethane, dichloroethane, acetone, hexane, alcohol are used to selectively extract the colour principles from various raw materials by column extraction either in hot or in cold conditions followed by the removal of solvents used. The refluxing solvent repeatedly washes the solid extracting the desired compound into the flask. Generally, Spice oleoresins are extracted by this method. Unfortunately, organic solvent extraction i.e. soxhlet of plant materials, such as spices may lead to oxidation colouring compounds, especially in the presence of air. However, the use of organic solvents are expensive, energy consuming and safety hazardous.

Supercritical Fluid Extraction (SFE)
The SFE is identified applicable in the extraction of colour of natural sources. When a certain fluid is forced to pressure and temperature higher than its critical point, it becomes a supercritical fluid. Under these conditions, the properties of fluids lied between those of a gas and those of a liquid. Although a supercritical fluid density is similar to a liquid and its viscosity is similar to a gas, its diffusivity is intermediate Supercritical fluids have better transport properties than liquids, so it can diffuse easily through solid materials and therefore allow obtaining higher extraction yield. It is a clean, safe, inexpensive, non-flammable, nontoxic, environmentally friendly, non-polluting method carried out using solvent carbon dioxide (CO2). Also energy costs associated with SCFE is lower than the conventional techniques.

Supercritical Water Extraction (SWE)
SWE is a method of extraction using hot water under pressure, has recently emerged as a useful tool to replace the traditional extraction methods and is among the more promising processes. Very high temperatures (over 400°C) and moderately high pressures are required to achieve the critical point of water (figure 3). These extraction techniques provide higher selectivity yield, environmentally-clean process, shorter extraction times and no toxic organic.

Ultrasound Assisted Extraction (UAE)
UAE is carried out by mixing dried and ground sample in methanol or any solvent in a flask, which is usually placed in an ultrasonic bath at temperature 30°C to 60°C for 30-50 min. The extraction is repeated two-three times and the extracts are collected. The higher yield obtained in this process is of major interest from an industrial point of view, since the technology is an “add-on” step to the existing process with minimum alteration and application in aqueous extraction where organic solvents can be replaced with Generally Recognized As Safe (GRAS) solvents, reduction in solvent usage, and shortening the extraction time. The use of UAE is an economical alternative to traditional extraction process, which is an industry oriented adoption for a sustainable development.

Microwave assisted Extraction (MAE)
The fundamentals of the MAE process are different from those of conventional methods (solid–liquid or solvent extraction) because the extraction occurs as the result of changes in the cell structure caused by electromagnetic waves. In MAE, the process acceleration and high extraction yield may be the result of a synergistic combination of two transport phenomena: heat and mass gradients working in the same direction. A series of phenomenological steps must occur during the period of interaction between the solid-containing particle and the solvent effectuating the separation, including (1) penetration of the solvent into the solid matrix; (2) solubilization and/or breakdown of components; (3) transport of the solute out of the solid matrix; (4) migration of the extracted solute from the external surface of the solid into the bulk solution; (5) movement of the extract with respect to the solid; and (6) separation and discharge of the extract and solid. Other techniques like microwave-assisted distillation, microwave hydro-diffusion, vacuum microwave hydro-distillation,
microwave-integrated soxhlet extraction and solvent-free microwave extraction are proven to be efficient extraction technologies.

**Figure 4: MAE working mechanism**

**Enzyme Treated Extraction**

There is a great potential for this enzyme-based extraction technology with the selection of appropriate enzymes with optimized operating conditions. Various enzyme combinations are used to loosen the structural integrity of plant material thereby enhancing the extraction of the desired colour components. Recently enzymes have been used for the extraction of colour from plant materials, as a pre-treatment to raw material before subjecting to hydrodistillation/solvent extraction. Although the enzyme hydrolases such as lipases, proteases (chymotrypsin, subtilisin, thermolysin, and papain), esterases are used. Some of the plant materials rich in colours which have been exploited for enzyme-assisted extraction are chilli, paprika, vanilla, ginger, garlic, cloves etc. and the results have shown positive effects.

Suggested references:


<table>
<thead>
<tr>
<th>Method</th>
<th>Soxhlet Extraction</th>
<th>MAE</th>
<th>UAE</th>
<th>SFE</th>
<th>SWE</th>
<th>Enzyme treated</th>
<th>PLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraction Time</td>
<td>3–48 h</td>
<td>3–30 min</td>
<td>10–60 min</td>
<td>10–60 min</td>
<td>10-60 min</td>
<td>1-10 hours</td>
<td>5–30 min</td>
</tr>
<tr>
<td>Sample Size</td>
<td>1–30 g</td>
<td>1–10 g</td>
<td>1–30 g</td>
<td>1–5 g</td>
<td>1-5 g</td>
<td>1-50 g</td>
<td>1–30 g</td>
</tr>
<tr>
<td>Solvent use</td>
<td>100–500 ml</td>
<td>10–40 ml</td>
<td>30–200 ml</td>
<td>2–5 ml (solid trap)</td>
<td>5–20 (liquid trap)</td>
<td>2–5 ml (solid trap)</td>
<td>5–20 (liquid trap)</td>
</tr>
<tr>
<td>Investment</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Advantages</td>
<td>Easy to handle, no filtration necessary, high matrix capacity</td>
<td>Fast and multiple extraction, easy to handle, moderate solvent consumption temperatures, no, elevated temperatures</td>
<td>Easy to use, multiple extractions</td>
<td>Fast extraction, low solvent consumption, concentration of the extract, no filtration necessary, possible high selectivity, low use of toxic solvents, automated systems</td>
<td>Fast extraction, low solvent consumption, concentration of the extract, no filtration necessary, low use of toxic solvents, automated systems</td>
<td>Less extraction time, minimal usage of solvents, and a product with increased yield and quality</td>
<td>Fast extraction, no filtration necessary, low solvent consumption, elevated temperature, automated systems</td>
</tr>
<tr>
<td>Disadvantage</td>
<td>Long extraction time, large solvent volume, cleanup step is needed</td>
<td>Extraction solvent must absorb microwave energy, filtration step required, waiting time for the vessels to cool down</td>
<td>Large solvent volume, filtration step required, repeated extractions may be required</td>
<td>Many parameters to optimize, especially analyte collection</td>
<td>High energy requirement</td>
<td>Cost of enzyme is high</td>
<td>Possible degradation of thermo labile analytes, cleanup step is needed</td>
</tr>
</tbody>
</table>
Indian Spice Exports - An Overview

Sajana S., Senior commodity Analyst, Foretell Business Solutions Pvt. Ltd.

India is ‘The Land of Spices’ and the glory of Indian spices are known throughout the world. India commands a formidable position in the world spice trade. Indian spices are popularly known for their flavor and aroma in domestic as well as in the international markets. Out of 109 spices listed by ISO (International Standards Organization), India produces around 75 spices in its various climatic regions. India is one of the largest producer, consumer and exporter of spices in the world. India on an average exports around 546 thousand tonnes of spices annually. Chilli, cumin, turmeric and ginger hold a major share (in terms of volume) in overall spices exports from India. But in terms of value Mint and mint products stand holds a major share followed by chilli, oils, and oleoresin (Ref fig:2&3).

In the last ten years Indian spices exports increased substantially in terms of volume (10%) and value (17%) (Ref Fig: 1). Cumin (CAGR-51%), garlic (CAGR-34%), small cardamom (CAGR-24%) and ginger (CAGR-22%) are the major contributor in overall increase in spices exports (in terms of volume) and in value terms small cardamom exports have increased by 33%(CAGR) followed by cumin (CAGR-29%) ,ginger (CAGR28%) and Nutmeg(CAGR 28%).

India has exported around 662 thousand tonnes of spices in the year 2015-16 (Apr-Dec’15) against the same period last year exports of 658 thousand tonnes and in terms of value spices exports for the year 2015-16(Apr-Dec’15) is around $2116 million compared to same period last year export value of $1867 million (source: Trade source). Increase in Chilli, Pepper, and Small cardamom, Fenugreek, Oils and Oleoresins exports in both volume and value terms contributed substantially.

The world in the recent years has witnessed many changes in terms of economy, culture and social life of the people. This has lead to the change in food habits of the people. People have moved towards ready to cook, ready to eat and fast foods. Change in food habits has lead to change the spice consumption. Fig: 4 and 5 shows that growth in value added spices exports (quantity and Value) are higher in the last five years compared to whole spice exports (except ginger and cumin).
Major Spices’ Exports

Pepper
India is one of the major producers and exporters of pepper and pepper products (Processed) across the world. India on an average exports around 22 thousand tonnes of pepper. Meanwhile, it imports around 17 thousand tonnes of pepper. Growth in Indian pepper exports is just 0.2 % (CAGR) in the last 10 years. Whereas in value terms it is growing at a rate of 18% (increase in value is mainly because of increase in price. USA, UK and Germany are the major importers of Indian pepper. In the recent years, pepper exports to these countries have declined (Ref Fig: 7) because of decline in India’s production, increase in Vietnam production, (Vietnam exports around 90% of its produce. On an average Vietnam produces around 100 thousand tonnes of pepper annually quality issues and price difference (India’s pepper is quoted higher in the international market compared to other producing countries price).

India exports pepper majorly in the form of whole pepper, powder and oleoresins. Growth in the whole pepper exports in the last 10 years is less compared to powder and oleoresin (Ref Table: 1)

Turmeric
India is the largest producer, consumer and exporter of turmeric across the world. India has monopoly over world turmeric trade. Other producing regions are Pakistan and Bangladesh. On an average India exports around 61 thousand tonnes of turmeric annually (Apr-Mar). Indian exports are growing at a rate of 7.6 % (in terms of Volume) and 17.6% (in terms of value) respectively.

Fig.8 shows that turmeric exports in terms of volume have increased suddenly from the year 2011-12.
Increase in exports is mainly due to increase in Indian production (Indian turmeric production has increased from 400 thousand tonnes in 2010-11 to 634 thousand tonnes in 2011-12).

Similarly export value started increasing from 2008-09. Export value increased because of increase in turmeric price in the domestic market. Prices of turmeric started increasing (in domestic market) from $543/ Tonne (2007-08) $810 dollar/Tonne (2008-09) and again it moved up to $3002/Tonne in 2010-11.

India mainly exports turmeric in the form of fingers and bulbs. India also exports turmeric oleoresin and powder but the quantity is less. USA, UAE, Iran and Malaysia are the major importers of Indian turmeric (Ref Fig: 9).

Fig: 9 show that export of turmeric to Iran is growing annually at a rate of 22%. The growth of turmeric applications in food and non foods applications is one of the main reasons for the increase in turmeric imports.

Chilli
Chilli is one of the important commercial crops of India. In India, chillies are grown in almost all states of the country. The important states growing chilli in terms of production are Andhra Pradesh, Karnataka, Madhya Pradesh and Tamil Nadu. On an average (of 10 years) the country exports around 222 thousand tonnes of chilli worth of 309 million dollar. Among the

Cumin
India is the sole supplier (Currently) of cumin to the world market. Indian cumin exports started increasing (in terms of value and volume) from 2011-12 (Ref Fig10), mainly because Syria was unable to supply cumin to the world market because of Syrian war and Turkey has stopped exporting cumin (Syria and Turkey used to export around 35-40 thousand tonnes of cumin). India exports cumin in the form of seeds and powder. Indian cumin exports in the form of seeds are growing at a rate of 11% and the powder exports is increasing at a rate of 36%. Vietnam, UAE and USA are the major importers of Indian cumin.
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spice exports, chilli share is about 22%. Chilli exports are growing at the rate 11% (in term of Volume) and 18.5% (in term of Value) respectively (Ref Fig.12). Major importing countries are Malaysia, Sri Lanka, UAE, USA and Bangladesh. (Ref Fig.13)

Malaysia is the largest importer of Chilli from India. Most of chillies imported by Malaysia are processed and re-exported to other countries. Malaysia exports around 18 thousand tonnes of pepper annually.

Cardamom
On an average cardamom exports from India during 2004 to 2015 was 1.9 thousand tonnes. But, during the past five years there has been a phenomenal rise in cardamom exports i.e. almost 3.1 thousands tonnes (2010-2015). This export has increased may be due to low production of cardamom from Guatemala and the quality issues. Cardamom exports have shown positive growth rate around 24% (in term of volume) and 34% (in term of value) (2004-15). The government of India has fixed a minimum cost insurance freight (CIF) price of Rs 500 for the imported cardamom. However on an average cardamom imports during 2004 to 2015 was 0.5 thousand tonnes. Saudi Arabia and U.A.E are the major cardamom importers from India (Ref Fig.15).

Coriander
India is the largest producer, consumer and exporter of coriander with greater share (80%) in world export market. Other major producers are Bulgaria, Romania, and Morocco. On an average India exported around 34 thousand tonnes (in term of volume) and 38 million dollar (in term of value) respectively. From 2004 to 2015, there was a 6% rise in term of volume and 20% rise in term of value (Ref Fig.16). The main international markets where Indian coriander sold are: Malaysia, Saudi Arabia, U.A.E, and UK (Ref Fig.17).

Ginger
Indian ginger exports are growing at a rate of 15% and 22% in terms of volume and value respectively. Ginger exports increased mainly because of increase in production across India (Indian ginger production has increased from 500 thousand tonnes (2004-05) to
700 thousand tonnes (2015-16) over the years), India exports ginger mainly in the form of dry ginger, oil and oleoresin. Spain, USA and Bangladesh are the major importer of Ginger from India.

**Oils and oleoresin exports**

Indian oils and oleoresin exports are growing at a rate of 10% (volume) and 13% (value) annually. Changing food habits and life style is one of the reasons for increase in exports (Food ingredient segment, neutracautical, speciality food trends and food safety concerns also are driving this). USA, China, Germany and U.K are the major importer of Indian oils and oleoresin. Exports to China, USA and U.K are increasing year on year but exports to Germany have remained almost same (Ref Fig21).

**Curry powder/paste exports**

Curry powder/paste exports of India are growing at a rate of 11.4% and 17.8% (in terms of volume and value respectively). The major importing countries are U.K, USA, UAE and Saudi Arabia (Ref Fig.23)

**Mint products**

India is the largest producer of mint products in the world. Mint exports contribution in the overall exports is just 2% in volume terms but in value terms, it is higher than the other commodities. China is the largest importer of mint products. China mostly imports mint in the form of mentha oil the other forms of exports are mint crystals and powder (Ref Fig25)
India also exports garlic, fennel, celery, fenugreek, nutmeg and mace. India exports around 14 thousand tonnes of garlic annually (Apr-Mar). In the recent years exports of garlic has gone up from 12 thousand tonnes to 21 thousand tonnes. Exports have increased because of decline in production in other major growing regions (China, Argentina). Bangladesh, Malaysia and Indonesia are the major importers of Indian Garlic.

India’s yearly (Apr-Mar) exports of nutmeg and mace are around 2.5 thousand tonnes. Vietnam and UAE are the major importer of Indian spice (nutmeg and mace). In the meanwhile India annually imports on an average 1 thousand tonnes of nutmeg and Mace.

India exports around 20 thousand tonnes of fenugreek annually (Apr-Mar). The major importing countries are Egypt, U.A.E and USA.

India’s annual (Apr-Mar) Celery and Fennel exports are around 4 thousand tonnes and 8 thousand tonnes respectively. USA and Vietnam are the largest importer of these commodities.

The demand for spices and spice extracts is booming globally. The demand for a variety of traditional cuisines of different cultures and ethnic groups is driving the demand for various spices and spice extracts to meet the rising demand. Spices Board of India is setting up a number of programmes (under the scheme “Export development and promotion ”) to support exporters to adopt high tech processing and to develop capabilities to meet the changing food safety standards in the importing countries. All these parameters are likely to boost the Indian spices exports in the coming years.

Note: Source: Spices Board.
*Estimated
*Average of exports is calculated for last ten years from 2004-15.
*Exports growth rate is calculated by CAGR(Compound annual Growth rate)
Futures and the Paradigm Shift in Mentha Oil Market Dynamics

Department of Research and Planning, Multi Commodity Exchange of India Ltd.

Mentha is an aromatic herb. Steam distillation and filtration of dried Mentha arvensis leaves produces mentha oil, which can be processed to yield menthol and other derivatives. Mentha arvensis is widely used in a food, flavorings, pharmaceuticals, and cosmetics. Worldwide, approximately 50,000 tonnes to 60,000 tonnes of natural menthol is used by the pharma-cosmetics and cigarette industries every year (industry sources). Until about 15 years ago, the bulk of the world’s Mentha arvensis came from Brazil and China. China and India subsequently overtook Brazil and, more recently, India leads the world in production. Mint cultivation was introduced to India as a Zaid (intervening crop between rabi and kharif) season crop in the 1980s.

Mentha arvensis was first introduced in India between 1958 and 1964 by the Regional Research Laboratory, Jammu Tawi. In the 1980s, new strains were introduced by the Central Institute of Medicinal and Aromatic Plants (CIMAP) that gave improved oil yields. By 1996, India was producing 6000 tonnes of mentha oil, and surpassed 38,000 tonnes in 2014-15, according to tradesources. Much of the increase in mentha oil production, particularly its exports, came in after 2004, after the introduction of futures contracts based on mentha oil as the underlying.

Around 1990, Menthol displaced vanillin as the world’s chief aroma chemical. A few years before vanillin was dethroned with the introduction of ‘Shivalik-88’ and ‘Kosi’ by CIMAP (hybrid clones of Mentha arvensis), India began to slowly emerge as the dominant producer in the world mentha oil market. Today, India meets more than half of the global demand for mint products.

India accounts for about 80% of the world’s mentha production today. Mentha cultivation is labour intensive and a single harvest of big hectares of mentha brings in close to Rs. 20,000 at 2012 prices.

Mint derivatives are popular because of their pleasant taste and their association with freshness, cleanliness, and hygiene. Mint oils are primarily obtained by steam distillation of the fresh herbage of mint plants. The industry clubs mint oils into two groups, a) peppermint, and b) spearmint. Peppermint oils are derived from two distinct species:

- Mentha arvensis (cornmint) containing 60–80% menthol.
- Mentha piperita (peppermint) containing 40–43% menthol.

The overall global demand for mentha oil (both natural and synthetic) was put at 32,000 tonnes in 2015.

Rise in production and value-added exports

There has been a rise in India’s export of mentha crystals from 2004–05 onwards (Fig.1). From the mid-

1990s, there has been a sharp increase in production and export of mentha oil from India, while the first decade of the 21st century has witnessed another major structural shift towards manufactured crystal exports. Spices Board data indicate that by the end of the first decade of the 21st century India was exporting close to something between 17,000 tonnes and 20,000 tonnes of mint products.

The global centre of production of mentha oil and manufacture of menthol crystals has shifted several

*Bigha here refers to the local bighas prevalent in central UP*
times in the last 50 years. Before World War II, menthaoil was produced primarily in Japan and China. World War led to a boom in its demand (in the form of mentholized supply of cigarettes to the U.S. forces around the world) and a disruption of supplies from the East.

Entrepreneurs (Japanese and Chinese immigrants) in Brazil and Peru stepped in and quickly established control over the major western markets by 1960s. China’s exports were curbed under severe embargoes. Chinese exports again began to dominate from the 1970s. From the 1980s till the mid-1990s production in Brazil declined sharply as a major shift towards capital-intensive mechanized farming took off and China turned away from exports to meet growing domestic demand for menthol products.

The rise of Indian exports occurred around the same time, aided by the successful introduction of indigenous varieties developed by Central Institute of Medicinal and Aromatic Plants (CIMAP). Although Chinese cultivation of mentha and production of menthaoil stagnated, it continued to be the major centre for crystal production till mid 2004–05. Lack of domestic production of oil had created a susceptible Chinese supply system and in 2004 several leading Chinese exporters defaulted on a major scale in export deliveries. China’s export default in 2004–05 catalyzed India’s shift towards crystal manufacturing.

The shift to crystal manufacturing occurred around the same time MCX introduced the Menthaoil contract. This was significant, since manufacturing (with in-process lead time of a month) exposed exporters to long-term price risks. The exporter/manufacturer complex, that is, the consumer of raw menthaoil, is far more concentrated than any other commodity in India. According to estimates by Clark (2007), the total processing capacity in India is between 8,000 tonnes and 10,000 tonnes of L-menthol.

Another significant feature of the commodity is that it has gone through long-term price cycles every decade. The price peak in 1970s coincided with the exit of Brazil from the market, while the peaks in 1980s and 1990s were reflective of gradual withdrawal of Chinese raw material supplies from the export market. The immediate past long-term period coincides with a long-term upward swing in prices, as global menthaoil supply adjusts to the major structural shift in India’s emergence as the major producer of menthaoil and processed crystals amidst a consistent growth in demand.

**Inherent volatility call for risk management**

Mentha has a long shelf-life, and can be stored up to seven years in cans, bottles, or drums. Mentha’s long shelf-life creates conditions for an inventory pile up. Storage is thus absolutely decentralized and fragmented.

Mentha’s long shelf-life creates unexpected fluctuations; on the one hand farmers/stockists hold on to inventory, and on the other, much larger volumes of inventory than the current production occasionally get offloaded in the market. The menthol market is said to be inelastic on the demand side, since it is a minor (quantitatively), but key (chemically) raw material whose cost is a small share of the final product cost. A 1,000 tonne shortage or over supply of menthol in the world market can make prices double or fall by as much as 50%—this can happen in the most stable harvest conditions (in 1978 international menthol prices shot up to $100/kg!).

Mentha oil prices have always been quite volatile, with annualized volatility in spot prices hovering around 20% to 30%. Mentha oil annualized price volatility was at around 27% in 2015 (Fig. 2). This means that a mentha oil trader with an annual turnover of Rs10 crore was exposed to a price risk of about Rs2.7 crore in 2015. Overall, India, with an estimated mentha oil market of Rs3,000 crore, is exposed to volatility risk of Rs810 crore (that is, 27% of the holding value). Hence, adoption of a risk management practice, such as hedging on MCX, can shield stake holders against the perils of price volatility.

**Uniqueness of MCX mentha oil spot price polling**

Mentha Oil Futures traded on MCX is deliverable at Chandausi, with Barabankia an additional delivery centre—both the towns are in Uttar Pradesh. As

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the annual crop size of mentha is low as compared with other commodities such as cotton (produced in millions of tonnes), MCX, as a precaution, has created an index to poll the spot prices of mentha oil. After a detailed study, MCX has assigned the following weightages to these important centres: Sambhal 25%, Barabanki 30%, Chandausi 15%, Rampur 15%, Badayun 7.5%, and Bareilly 7.5%. This indexation of spot prices has made it attractive for participants as it is a broad reflection of the mentha economy.

Map of the trade network in Mentha:
Mentha is produced in small operational holdings across a wide area, primarily in Uttar Pradesh. Mentha is very easy to store and does not require any special treatment for preservation for two-three years. A 2012 joint study by IIM Calcutta and NISTADS, New Delhi, found three main layers in the mentha trade network.

a) Village level. This consists of a few village traders, who aggregate and pool small amounts of mentha that each farmer sells. Mentha in very small volumes (1 litre) is traded here. Procurement of mentha is a seasonal activity for the village trader, who has other trading/retailing operations too. Location of such shops is usually in the local bazaar (usually a cluster of shops on the roadside).

b) Town trader in commercial market. The principal physical-trade markets, such as Sambal, Chandausi, Barabanki or Koonch have a mentha bazaar (mandi), where several town traders operate. These markets have three categories of traders – independent traders, agencies controlled by large exporters or manufacturers (an agency can have tie-up arrangements with more than one manufacturer or exporter), and traders affiliated with MCX-approved warehouses. Large traders, principal exporters or manufacturers buy from this market. The unit of trade is 180 kg drums of mentha oil.

c) Very large trader. Mostly would be located in principal production centres and metropolitan cities. The marketing channel of mentha oil is given below. Pre- and post-futures impact assessment
The mentha oil market has greatly improved after the arrival of futures and MCX is only exchange for mentha oil futures. MCX had an average daily volume and open interest of 1850 tonnes and 4250 tonnes respectively, with
an average daily turnover of Rs 78 crore. It is also the largest mentha oil exchange in the world. An analysis of MCX spot and futures price has revealed about 92% correlation between the two prices, indicating that the market is strongly integrated. Earlier, there was no record of the prices, now there is, with prices pooled twice daily from major mentha oil markets.

The pre- and post-futures transformation of the market has been remarkable, to say the least. Post-futures, the acreage under cultivation has increased substantially as evident from significant increase in production as remunerations have grown. Production has increased from 12,000 tonnes in 2004 to 30,000 tonnes in 2015, as per trade sources. Besides, quality testing standards have improved—showing the menthol content in mentha oil and fetching more price in the market. That apart, post-futures, the price spread has reduced, dissemination of market information has been vast and varied through various information channels, thanks to the information, communication technology revolution. Mentha has emerged as a major cash crop in its growing region, and being labour-intensive, has generated many jobs.

MCX also provides an efficient channel for delivery and marketing of mentha oil. The MCX Mentha Oil June 2015 contract witnessed a record delivery of 13.5 lakh kg valued at approximately Rs. 156 crore. In terms of both value and quantity this is the highest delivery executed in Mentha Oil on the Exchange platform, since the contract’s launch in 2005.

The MCX Mentha oil contract has been a revenue earner for the government too. According to the afore mentioned joint study of IIM Calcutta and NISTADS, through the trading in mentha oil, Government of India has accrued tax revenue of Rs 411 crore during 2005-06 to 2011-12.

A 2009 study by the United Nations Conference on Trade and Development (UNCTAD) found that Mentha farmers in India have benefitted significantly from the futures market through a more efficient price discovery, reduction in information asymmetry, reduction in intermediaries in the value chain and reduction in spot price volatility.

**Conclusion**

The arrival of the futures market in mentha has brought about a profound transformation in the dynamics of trade in that commodity. The futures market has not only met the risk management requirements of the traders and processors exposed to domestic and international markets, but has seen the growth of new trading, certification and merchandizing practices.

The instantaneous price dissemination through various channels, which have been discovered on the transparent electronic platform of the futures exchange like MCX, has empowered the various stakeholders and tremendously boosted their confidence. And as days go by, the futures market and the ecosystem it has given birth to, grow stronger by the day, though the traditional market still continues to exist. However the idea is not let the new replace the old but both remain complementary to each other.

The government has been cautious though, and the market awaits the participation of several institutional agencies in the futures market, which could impart both depth and liquidity to it. However, mentha arouses excitement in all quarters as India has become the world’s biggest producer of an important crop for a number of major industries. As a mentha farmer said: “Mentha oil is like gold; it can be sold anytime, anywhere and in any amounts. You will always find a trader to buy it.”
Kampot Pepper

Frederic Fretard, Fair Farms, Cambodia

Introduction:
Black pepper has a long history with Cambodia, particularly the area of Kampot, but its economic importance in the Indochina era of the first half of the 20th century had unexpected consequences in the second part of the century, almost causing its complete eradication from the region under totalitarian rule.

Now thanks to the efforts of the Cambodian government and the Kampot Pepper Promotion Association (KPPA), Kampot pepper is making a remarkable comeback on the dining tables around the world.

1. Brief history:
Cambodian pepper goes back as far as the 13th century as shown in the account of the Chinese explorer Chou Ta-Kuan who spent a year in Cambodia from August 1296 to July 1297:
“Pepper is occasionally found. It grows twisted around the stems of the rattan, fastening on like a hop vine. Pepper that is fresh and blue-green has the most savor.”

But it really thrived under French rule in the first half of the 20th century, as colons took notice of the quality of the region’s soil for cultivation of tropical goods that were in demand in international markets like black pepper but also coffee or tobacco.

In 1930, in the book “Un empire colonial français, l’Indochine”, an encyclopedia of the French possessions in Indochina, it is noted that “pepper is by far the main colonial export crop. Almost all the pepper consumed in France – 2100 tons in 1927; 2600 tons in 1928 – comes from Indochina, even more so since the April 1928 custom law allows unlimited imports of pepper from the colonies. The French colony exports even more: 3416 tones on average over 3 years, and up to 4235 tons in 1927.”

In the middle of the 20th century the production of Kampot pepper was roughly 3000 tonnes per year, with a product of exceptional quality. But during the Indochina war and subsequent regime, nearly all the plantations were destroyed and replaced by rice plantations or left fallow for the jungle to devour.

2. Geographical indication (GI)
In 2010, Kampot pepper and Kampong Speu palm sugar were the first Cambodian goods to obtain the World Trade Organization-backed GI status, an upgrade that links quality of a product to its origin, protects it under international law and creates brand recognition on the global stage.

As part of its GI designation, French certification body Ecocert verifies that the final product originates from the defined geographical area in southern Cambodia and is produced without chemical fertiliser using traditional pesticide-free growing methods.

The delimited production area actually spans across two provinces. In the Kampot province, the area comprises the districts of Kampong Trach, Dang Tong, Toeuk Chhou and Chhouk, and the city of Kampot itself. These are complemented by the district of Damnak Chang Aeur.
and the city of Kep in the Kep province, also famous for its blue crabs.

The land plots have to be located on the hillock or base of a mountain, with lateritic (ie: rich in iron oxide) rocky or sandy soil. Two varieties of pepper can be grown: Kamchay and Lampong, locally known as “small leaves” and “big leaves” varieties.

Dead standards (ie: wooden poles), as high as 5 meters and separated at least by 1.80 m, are used to support the trees, fertilization is done with natural manure (bat dung and cow manure) and natural means should also be used for pest control before any other option is considered (alternatives are Class II and III insecticides, as classified by WHO).

3. Processing
The whole color spectrum of pepper can be produced and sold as Kampot pepper as long as it follows the Book of Requirement.

Green pepper, the unripe fruit of the pepper plant, is harvested when still young on the plant and can be consumed either fresh (within 7 days after harvesting) or in brine or vinegar.

Black pepper and red pepper are harvested from ripe peppercorns. Berries are then dried on nylon, mat or tent and above the soil. Dried grains are sorted manually in order to eliminate the foreign bodies, small size berries and unwanted residues, and separate the grains according to their color.

White pepper is produced from red or black berries by soaking them in boiling water during 5 minutes and then cooling them in cold water for a maximum of 48 hours. The exocarp (ie: the “skin”) is then removed to reveal the white flesh of the fruit.

Strict hygiene rules apply for all workers (for harvesting and sorting), containers and processing areas. Storage should be done in facilities which are well ventilated, protected from sunshine and humidity, not directly on the ground and clear of chemical or microbiological contamination.

4. Volumes and prices
A report released by UNCTAD (United Nations Conference on Trade and Development) in September 2015 showed that “prices for Kampot pepper had increased significantly after producers gained access to wider and more diversified markets as a result of GI certification”.

According to figures from the Kampot Pepper Promotion Association, both price and output have been rising since the GI qualification. In 2008, just four tonnes of Kampot pepper were sold: black pepper at $4.50 a kilogram, red pepper at $8 per kilogram, and white pepper at $10 per kilogram. In 2013, 21 tonnes have been sold at $11 a kilo for black, $15 for red and $18 for white (NB: farm gate prices).

In 2015, Kampot’s total pepper output almost doubled to 60 tons compared to the previous year’s 32 tons, but only 58 tonnes were delivered to the market with the Kampot pepper certification. Still according to KPPA, the cultivated area grew from 90 hectares to 110 hectares, of which 40 hectares will be ready for the next harvest in late-February, yielding 70 tonnes to 80 tonnes of certified Kampot pepper.

In a year marked by El Niño conditions, the increased cultivation area has offset losses due to drought, and prices continue to rise steadily despite the increase in output.

In 2014, black pepper cost $11 per kg; red pepper $20 per kg; and white pepper $18 per kg. A year later, black pepper increased to $15 per kg, red pepper to $26 per kg and white pepper to between $28 and $30 per kg (NB: farm gate prices).

Larger farms have also been set up in the last couple of years which will boost the volume of pepper produced in Kampot, but this remains a drop in the ocean compared to the 150,000 MT or so of black pepper (non GI) produced in Vietnam each year, and is also a far cry from the 3,000 tonnes that were available in Kampot in the middle of the 20th century.

5. Market dynamics
Producers of Kampot pepper have positioned the spice as a high-end product and are working to add value to the internationally recognised brand by ensuring that only the highest quality peppercorns make it to market.

Studies show the certification resonates with health-
conscious Western consumers, and fetches higher prices in international markets.

The specificity of the Kampot Pepper lies in its strong (but not “burning”) pungency and aromatic intensity. It is said to be crisp with a mildly smoky finish, and the red berries are sweet in fragrance.

Luxury grocery stores like Hediard in Paris or specialist shops like Roellinger Epices or Edelices have put Kampot pepper on their shelves, but these markets only represent the tip of the pyramid.

Even so, the KPPA estimates that about 80% of this year’s harvest (estimated at between 70 and 80 tonnes in 2016) is already subject to client orders. Of these, 70% were placed by international buyers, while 30% were for domestic supply.

The Association now has 242 independent farmers and 17 companies, both international and local. Most of the increase in this year’s output is due to these 17 companies, underlying the status change from a product grown mostly by local farmers and sold locally or regionally (Vietnam) to a modern export product (at a time when foreign capital is leaving emerging economies) and can now be promoted and sold on international markets due to its improving availability as the production area expands.

The first block of the supply chain is now ready to conquer the second stage of the pyramid.

Conclusion:
We at Fair Farms Cambodia are involved in the production of pepper in the Kampot region because we believe that once passed the initial development craze the geographical indication status will help the product mature into a world known and recognized product, by providing transparency and control assurance to the supply chain and ensuring that its market ecosystem is sustainable, thereby benefiting Southern Cambodia as a whole.

This will be achieved with good collaboration between producers, market operators and authorities for the management of the Kampot pepper GI.

The first signs of the positive impact on the development of the region can be seen with tourism figures, with visits to coastal areas of Cambodia (Kep and surrounding) increasing by 20% in 2015 compared to 2014. It still only represents about 30% of the visits to the famous Siem Reap sites but it is an encouraging indication of the improving prospects of Southern Cambodia that can be, at least partially, attributed to Kampot pepper.

Acknowledgements: the price and volume data comes from the Kampot Pepper Promotion Association via reputable national media (Phnom Penh Post and Khmer Times).
World Pepper Industry; Present Status and Future Trend

W.D.L. Gunaratne, Executive Director International Pepper Community, Jakarta - Indonesia.

During the last decade world Pepper industry has indicated certain changes mainly with respect to area under cultivation, production and export. The most prominent feature is the behaviour of prices and uncertainty of the future for major Pepper producers. However, after 2010, the price of Pepper became no matter for the producers as it was keeping the trend of climbing beyond the predictions and expectations of the producers and exporters throughout the world.

During the last fifteen years, no new big Pepper producing country has come to the seen but several changes have taken place in traditional Pepper producing countries. Overall area under pepper has not shown a considerable change despite of that, Vietnam has increased the area of Pepper from 36,106Ha in 2001 to 57,000Ha in 2015 and China has increase its area by 14,300Ha during the same period. The reason for the overall stagnation of the area may be the readjustment of the area under Pepper in India by 2008 to a realistic figure. This decision has headed to reduce area by about 50,000Ha may have taken by considering the data from the annual census and also to facilitate monitoring of the industry.

However, still India has the largest area under Pepper cultivation reporting 195,000Ha throughout the country while Indonesia remains at the second position having 116,000Ha. Vietnam has reported 57,000Ha of Pepper with gradual annual increase of the area and area under Pepper in Brazil was reported as 45,000Ha in 2004 but by 2006 it has come down to 35,000Ha. From 2007 to 2015, officially reported figure under Pepper in Brazil is 20,000Ha. Area under Pepper in Sri Lanka is reported as 32,4700Ha in 2015, coming to the 4th position and among the IPC member countries, area of pepper, in Malaysia is 16,300Ha, the lowest. Gradual increase in pepper area in China has reached now 25,000Ha. No significant change in area of pepper can be observed in other Pepper producing countries.

Production

Before 2001, the whole authority of the Pepper industry was held by India and Indonesia and from 2002 onwards, it was taken over by Vietnam. Within a short period of ten years, Vietnam could increase their production by eight fold to become the world largest producer and exporter of pepper. By 2004, Vietnam Pepper production touched 100,000Mt. As it is well established, Pepper is a crop highly sensitive to weather changes and mostly current year rain fall distribution decides the next year crop. Year to year change of the Pepper crop is obvious but with all, Indonesia has been able to maintain their Pepper production without drastic change but no improvement of the sector. Despite of that, Pepper crop in India has shown a decline and in six years from 2001, production decline by 29,000Mt was reported. The worst situation reported in 2014, during the decade reporting 37,000Mt of total production; a half of that at the beginning of the decade. Production in Brazil and Malaysia also indicated a gradual decline but were able to maintain their positions. Pepper production in Sri Lanka seems to improve gradually during the early part of the decade while touching the
maximum reported production of 28,000Mt in 2013. However, decline in production during 2014 to half of that is not well explained. Among the non IPC member countries, China is entering to the pepper industry steadily though the production is still not adequate to meet the growing local demand. Thailand and Madagascar maintain their position with no significant improvement. Cambodia is steadily entering to pepper production but no realistic data available for a period of time to make any comment. However, by 2014, reported production was nearly 8,000Mt.

Export
With comparison to total Pepper export in 2001, increase of the volume by almost 100,000Mt can be observed in 2015. Indonesia was holding the position of world number one Pepper exporter until the end of the 20th century but with beginning of the 21st century, that was undertaken by Vietnam and also continued steadily during the last 15 years with yearly improvements.

Figure 3. Productivity of Pepper (Mt./ha/yr) in IPC member countries

Productivity of Pepper
Low productivity of pepper in all the traditional Pepper growing countries is the major constrain. Average productivity in Vietnam is maintained above 2.0MtHa-1Yr-1 and Brazil and Malaysia maintain the average productivity over 1.5Mt Ha-1Yr-1. Low productivity in India and Indonesia could be attributed to the nature of scattered small pieces of land and mixed system of cultivation with little inputs. Over the years Sri Lanka is showing an increase in productivity of Pepper as a result of the emphasis given on the productivity improvement of the existing Pepper lands. Age of the plantations, pest and disease incidences, low inputs and high shade from support trees or the companion crops are the major reasons for low productivity in Pepper.

Pepper prices
Prices of Pepper are the main point in concern by producers, traders and consumers. The drop of Pepper prices with the onset of 21st century, ended with many speculations on future prices. Some of the producing countries did not pay any attention on industry expansion or even to maintain the existing crop. However, by 2009, price of Pepper, increased beyond all the predictions on future prices and still no firm prediction on price stability for future is made based on systematic analysis (Figure 5).

There is no decline in supply but prices are in increasing trend. Recent investigations reveals that the change of food habits, increase income in new markets and deviating from artificial flavours have created higher demand for natural food like spices. Though no quantified strong evidences available, it is likely to continue the present prices for Pepper with no decline for future.

Figure 4. Harvesting Pepper in Vietnam

Figure 5. World Pepper price trend during last fifteen years
Figure 6. World Pepper price trend during last forty years

**Pepper Exports**
Vietnam remains the number one producer and exporter of Black and White Pepper to the world. Until 2009, Indonesia, maintained its position as the world largest producer and exporter of white Pepper but from 2009 onwards Vietnam became the largest exporter. Brazil maintained its position as the third largest exporter of Pepper with slight changes over the years. Production and export volumes of Pepper in Indonesia, India and Sri Lanka fluctuate significantly over the years but Malaysia show only slight changes.

**Challenges in Pepper industry**
For the pepper producing countries, maintaining their productivity is a challenge. Especially for the traditional producing countries like India, Indonesia and Sri Lanka, immediate action should be paid on productivity improvement by replanting of the old plantations, soil and moisture conservation to face the climate change uncertainties, adoption of more effective pest and disease control measures and safe use of pesticides. Quality is the most concern by the consumers as world is more and more health concern. After considering health of the consumers and environment as whole, possible use of natural pesticides and fertilizers should be given more emphasis. Sharing information is the option for that.

Over supply need to be monitored to keep the price stability with closer monitoring of the market from consumers end as well as the producers side.
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E-mail: golgar2000@yahoo.com.
Indian Dehydrated Vegetable & Spices Industry

Savji Thanth, CEO Maharaja Dehydration Pvt. Ltd.

Dehydrated Spices like Garlic, Turmeric, chili products have very large extent of applications and today’s world of Ready to Eat and Ready to Cook food segment which is growing. As a savory tastemaker, they are essential food ingredient of any food products.

As a natural product dehydrated vegetable is a substitute to all kind of need. As of now dehydrated vegetable are made using four different techniques viz...
Hot air drier, Freeze Drier, Drum drier and Spray drier
Each production process has its characteristic effects and it is suitable to its applications and convenience of use.

The trend in developed countries is moving towards on processed food products; and dehydration industry is solution to make available any season product to be served in off-season.

India at Present:
- India mainly exports dehydrated garlic in large volume compare to other dehydrated spices,
- Indian dehydration Industry is one of the fastest growing and currently world’s Second largest producer of dehydrated vegetables / spices products
- Indian geographically and workforce advantage has boosted up the growth from 5 to 6% annually.
- International Standards of Quality and low cost of production and makes product export-worthy and accepted worldwide.
- State of the art Food Processing technologies are installed to meet ongoing need of the food safety and standards
- Main dehydration factories are located in four states, Gujarat, Maharashtra, Madhya Pradesh and Rajasthan, around 130 dehydration factories are currently registered.
- Most of dehydration unites are in Mahuva, Talaja and Una in Gujarat State.

India’s Strength:
- Pesticide free - almost all Dehydrated products are screened negative for EU and JAM MRL’s
- Cost effective and Technical Modernized & Fully – Automation in Processing facility
- Abundance of GMO Free - Quality Raw Material availability,
- Fastest Growing and Good Farming Practices are widely performed.
- For Vegetables / Spices Products Best in class White and Red verity is available for dehydration .Indian Vegetables / Spices is having second highest solid content after Californian Vegetables / Spices

Indian Export Market:
- Total Indian dehydrated veg export: Rs. 874 Cr. (US $ 138.77 Mil) Ref: DGCIS year 2014-15
- As on today Indian Vegetables / Spices Dehydration Industry is ranking at No. 2 in world with production of 40000 to 42000 ton average (2012-2014). Indian dehydrated /spices production during 2014-15 was
around 51000 ton

- Dehydrated Vegetables / Spices export from India is approx.. 30000 to 32000 tons. Exports during 2014-15 was around 67000 tons.
- Major market share with 66% exporting to EU destinations.
- A strategic location: 58% exported through Mundra followed by 28% through Pipavav port.
- India’s almost 86% of export comes from Gujarat State only alone.

India’s Domestic market:
- Domestic consumption is around 50,000 tons. However, this volume is argely shared by garlic and vegetables / spices.
- Currently it is only used in seasoning and Ready to Eat or Ready to Cook products and not abundantly used in every day house hold uses.
- Expected to grow more in this segment as life style and Food Habits are changing.

Uniqueness of dehydrated spices:
- It is available throught the year , so it doesn’t matter if season is there or not.
- It is most convenient product to use and varied applications.
- Easy to transport.
- Long shelf life.

Standard Usage/Rehydration:
- To rehydrate, add approximately 6 parts water to 1 part Vegetables / Spices (by weight), soak for one hour without agitation and drain excess water. Can be added directly to most foods without prior

rehydration by adding approximately 4 parts additional water or liquid to 1 part Vegetables / Spices (by weight)

Approximate Equivalents:
- 1Kg of dehydrated Vegetables / Spices = approximately 4 Kg of rehydrated Vegetables / Spices (Equivalent of Fresh Vegetables / Spices)

Viscosity Control:
- Because of its ability to absorb liquid, dehydrated Vegetables / Spices can be used alone or with fresh Vegetables / Spices—instead of gums or other thickeners—to control viscosity in a variety of foods such as salsad, pasta sauces, condiments and frozen foods.

Major Dehydrated Products:

<table>
<thead>
<tr>
<th>Vegetables / Spices</th>
<th>Ginger</th>
<th>Tomato</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garlic</td>
<td>Green Chili</td>
<td>Banana</td>
</tr>
<tr>
<td>Potato</td>
<td>Turmeric</td>
<td>Orange</td>
</tr>
<tr>
<td>Carrot</td>
<td>Kasuri Methi</td>
<td>Pineapple</td>
</tr>
<tr>
<td>Beet root</td>
<td>Sweet Neem</td>
<td>Mango</td>
</tr>
<tr>
<td>Bitter guard</td>
<td>Coriander Leaves</td>
<td>Apple</td>
</tr>
<tr>
<td>Spinach</td>
<td>Mint Leaves</td>
<td>Strawberry</td>
</tr>
<tr>
<td>Mushroom</td>
<td>Basil</td>
<td>Papaya</td>
</tr>
<tr>
<td>Shallot</td>
<td>Parsley</td>
<td>Lemon</td>
</tr>
<tr>
<td>Bell pepper</td>
<td>Chives</td>
<td>Pomegranate</td>
</tr>
<tr>
<td>Eggplant</td>
<td>Chicory</td>
<td>Sapota</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Oregano</td>
<td>Kiwi</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Rosemary</td>
<td>Custard Apple</td>
</tr>
<tr>
<td>Okra</td>
<td>Thyme</td>
<td>Peach</td>
</tr>
<tr>
<td>Green peas</td>
<td>Spring Vegetables / Spices</td>
<td>Jackfruit</td>
</tr>
</tbody>
</table>
### Major applications dehydrated products:

<table>
<thead>
<tr>
<th>Different cut sizes</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Powder</strong> (flavor without pieces and texture)</td>
<td>Meat products, canned foods, Frozen food, Ready to eat food, gravies, soups, seasoning blends, crackers and many other snacks and specialty products</td>
</tr>
<tr>
<td><strong>Ground / Fine Granules</strong> (free-flowing, uniform dispersion)</td>
<td>Condiments, dressing, meat products, canned food, gravies, sauces, soup, cheese and bread spreads</td>
</tr>
<tr>
<td><strong>Granules</strong> (flavor with some texture)</td>
<td>Meat products, meatballs, sauces, bottle-packers, gravies seasonings and dipping sauces</td>
</tr>
<tr>
<td><strong>Minced</strong> (distinct particles for visual identity)</td>
<td>Soup, dressings, sauces, canned and prepared foods, meatloaf, seasoned canned vegetables, dry casserole mixes, relishes, cats up, savory bakery products and salad dressing</td>
</tr>
<tr>
<td><strong>Chopped</strong> (uniform pieces, ideal for food service)</td>
<td>Canned stewed tomatoes, bottle packers, seasoned peas and green beans, dipping sauces, hamburgers, hot dogs and many other savory canned and ready meal servings</td>
</tr>
<tr>
<td><strong>Large Chopped</strong> (specially sized for use in volumetric dispensing equipment)</td>
<td>Soups, sausages, meat products, ready to eat products, canned vegetables mixes, frozen specialties Vegetables / Spices rolls, stuffing mixes</td>
</tr>
<tr>
<td><strong>Slices / Kibbled / Flakes</strong> (ready to rehydrate for food service)</td>
<td>Canned and dry soups, dry casserole mixes, specialties and ethical foods, food service, salads, instant soup, burgers, pizza, salad bars, deli application, and fast food.</td>
</tr>
</tbody>
</table>
List of Exotic Spices and Herbs

Sowmya H.P., Commodity Analyst, Foretell Business Solutions Pvt. Ltd.

1. Afghan Saffron: Main growing regions; Kabul, Mazar-e Sharif and Herat province. Medicinal properties: Saffron contains many plant derived chemical compounds that are known to have anti-oxidant, disease preventing and health promoting properties. The active components in saffron have many therapeutic applications in many traditional medicines as antiseptic, antidepressant, anti-oxidant, digestive, and anti-consultant.

2. African bird pepper: African Bird Pepper grows in Malawi, South Africa, Ghana, Nigeria, Zambia, Zimbabwe, Mozambique, and the tropical forests of South Sudan & the southern half of Ethiopia. Medicinal properties: African Bird Pepper has the ability to ease stomach upset, ulcers, soar throats, spasmodic and irritating coughs as well as diarrhea.

3. Anise Hyssop: Main growing country is Upper North America. Medicinal properties: In folk herbal medicine, anise hyssop tea has been employed to facilitate the digestive process. The Native Americans also used anise hyssop as a medication to cure wounds, fevers, diarrhea and cough. Hyssop has been used traditionally in the production of liquors and perfumes.

4. Sumac: Main growing countries are Africa and North America. Medicinal properties: An infusion of Sumac berries is diuretic, emetic, emmenagogue, purgative and refrigerant. It is used in the treatment of late-onset diabetes, constipated bowel complaints, febrile diseases, dysmenorrhea (painful or difficult menstruation). The berries have been chewed as a remedy for bed-wetting. An infusion of Sumac blossoms used as an eye wash for sore eyes.

5. Espelette pepper: Cultivated in the French commune of Espelette, Pyrénées-Atlantiques, traditionally the northern territory of the Basque people. Medicinal properties: Used medicinally, it became popular as a condiment and for the conservation of meats. It is now a cornerstone of Basque cuisine, where it has gradually replaced black pepper.

6. Galangal root: Main growing countries are China,
68

India, and Malaysia.

**Medicinal properties:** Galangal contains anti-inflammatory properties and therefore is beneficial in treatment of arthritis and rheumatoid arthritis. It also helps to relieve discomfort caused due to inflammation of the abdomen and ulcers too. To curb sea and motion sickness, nausea, chew a few slices of fresh galangal. Galangal contains a host of anti-oxidants that helps to minimize the damage caused by free radicals and other toxins in the body. To improve blood circulation in the body, include galangal in your diet besides being a rich source of iron, sodium, vitamins A and C, it contains flavanoids and phytonutrients.

7. **Long Pepper:** Main growing countries are India and Indonesia.

**Medicinal properties:** Long pepper is used to improve appetite and digestion, as well as treat stomachache, heartburn, indigestion, intestinal gas, diarrhea, and cholera. It is also used for lung problems including asthma, bronchitis, and cough. Other uses include treatment of headache, toothache, vitamin B1 deficiency (beriberi), coma, epilepsy, fever, stroke, trouble sleeping (insomnia), leprosy, extreme tiredness, enlarged spleen, muscle pain, nasal discharge, paralysis, psoriasis, intestinal worms, snakebites, tetanus, thirst, tuberculosis, and tumors.

8. **Nigella Seeds:** Main growing countries are southern Europe and western Asia

**Medicinal properties:** Black Seed is recommended for a wide range of ailments, including fever, cough, bronchitis, asthma, chronic headache, migraine, dizziness, chest congestion, dysmenorrheal, obesity, diabetes, paralysis, hemiplegia, back pain, infection, inflammation, rheumatism, hypertension, and gastrointestinal problems such as dyspepsia, flatulence, dysentery, and diarrhea. It has been used as a stimulant, diuretic, emmenagogue, lactagogue, anthelmintic, and carminative. Black Seed has also been used externally where it is applied directly to abscesses, nasal ulcers, orchitis, eczema, and swollen joints. It is used as a spice in Middle Eastern and India dishes and is often dry roasted and used in curries and vegetarian dishes.

9. **Juniper Berries:** Mainly growing in the ancient Egyptian tomb of Tutankhamun.

**Medicinal properties:** Juniper is used for digestion problems including upset stomach, intestinal gas (flatulence), heartburn, bloating, and loss of appetite, as well as gastrointestinal (GI) infections and intestinal worms. It is also used for urinary tract infections (UTIs) and kidney and bladder stones. Other uses include treating snakebite, diabetes, and cancer. Some people apply juniper directly to the skin for wounds and for pain in joints and muscles. The essential oil of juniper is inhaled to treat bronchitis and numb pain.

10. **Negro pepper:** Mainly growing in Tropical Africa (Ethiopia to Ghana)

Medicinally, the fruits are used as a cough-medicine, a calmative, purgative and repulsive to pain. The fruit decoction is useful in the Treatment bronchitis and dysenteric conditions, and as a medicine for bulimia (eating disorder).

11. **Cardamom Black Whole:** Mainly growing in eastern Himalayas.

**Medicinal properties:** The therapeutic properties of black cardamom-oil have been found application in
Relish the earthy flavors

Dehydrated Onion Products
- Onion Flakes (White / Red / Pink)
- Onion Minced (White / Red / Pink)
- Onion Granules (White / Red / Pink)
- Onion Powder (White / Red / Pink)
- Toasted Onion Flakes (White / Red / Pink)
- Toasted Onion Minced (White / Red / Pink)
- Toasted Onion Granules (White / Red / Pink)
- Toasted Onion Powder (White / Red / Pink)
- Fried Onion Flakes (White / Red / Pink)

Dehydrated Garlic Products
- Garlic Flakes
- Garlic Minced
- Garlic Granules
- Garlic Powder
- Toasted Garlic Flakes
- Toasted Garlic Minced
- Toasted Garlic Granules
- Toasted Garlic Powder
- Fried Garlic

...Other Dehydrated Vegetables and Herbs
many traditional medicines as antiseptic, antispasmodic, carminative, digestive, diuretic, expectorant, stimulant, stomachic and tonic.

12. Dill Seed: Mainly growing in European countries. 
**Medicinal properties:** Herbal medicines made from the dill herb are used to treat flatulence, digestive disorders, stomach pain and dill seeds act as breath-fresheners.

**Medicinal properties:** This is used to cure for malaria fever (the leaves) and also used to treat wounds and prevent infection.

14. Cubeb berries: Mainly growing in Indonesia (hence the name Java Pepper), and are very popular in China and the Middle East. 
**Medicinal properties:** They are rumored to be an aphrodisiac and aid with fertility issues, and have been used in the treatment of ailments like lack of appetite, demonic possession, chronic bronchitis, oral and dental diseases, fever, bad breath, infection. They were popular among alchemists in the middle Ages. In China the berries are used primarily for medicinal purposes. Cubeb concoctions are common as aphrodisiacs.

15. Rosemary (Morocco): Main growing regions are Jerada, Talsint and Debdou. Rosemary has been known as a favored seasoning in many Mediterranean dishes, as well as an ingredient in soaps and other beauty products. Perhaps less well known is the herb’s purported medicinal benefit. 
**Medicinal properties:** Improve memory and hair growth, to relieve muscle and kidney pain, and to slow the growth of harmful bacteria. Some researchers are also investigating rosemary’s cancer-fighting potential.

16. Parsley: Main growing regions are Central Mediterranean regions (southern Italy, Algeria, and Tunisia), and also in Europe. 
**Medicinal properties:** Parsley is most popular as a garnish and is an excellent breath freshener. It is high in vitamins A and C, and contains iron, iodine, and copper. The parts used are the leaves, root and sometimes the fruits. Dried leaves have little or no fragrance. Parsley has many varieties. There is the plain parsley and the curled leaf parsley and many others.

17. Sage Leaves (Turkey): Main growing region is Albania. 
**Medicinal properties:** Due to its high antioxidant capacity, sage can help protect the body’s cells from damage caused by free radicals, which often results in cell death, impaired immunity, and chronic disease.

18. Thyme: Major producing regions: France, Switzerland, Spain, Italy, Bulgaria, Portugal and Greece.
Medicinal properties: Thyme antiseptic and tonic properties used for fungal infections, chest infections such as bronchitis, whooping cough and pleurisy. Industrial use: Used to preserve processed meat and butter, making chewing gums, ice cream, candy and Liqueur Benedictine.

Medicinal properties: Native North Americans use ground bark of Sichuan plant as a remedy for toothache. These peppercorns too found application in traditional medicines as stomachic, anti-septic, anti-spasmodic, carminative, digestive, expectorant, stimulant and tonic

20. Savory: Main growing regions are southern Europe and Mediterranean.
Medicinal properties: Savory herb is an excellent source of minerals and vitamins that are essential for optimum health. Its leaves and tender shoots are one of the richest sources of potassium, iron, calcium, magnesium, manganese, zinc, and selenium. Potassium is an important component of cell and body fluids that helps controlling heart rate and blood pressure. Manganese is used by the body as a co-factor for the antioxidant enzyme, superoxide dismutase. Iron is required for red blood cell formation. In addition, dietary fiber in this herb helps reduce LDL or bad cholesterol while increasing HDL or good cholesterol levels.
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Buffcove Spices
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Deepak Trading Co.
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Cardamom Black Whole

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Tel: +919890550001/91-712-2252014
Fax: 91-712-2252016

Dill Seed

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Email: mitesh@mragroindustries.com

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Fax: 234-01793121-9

Acuity Global Resources Enterprises
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Fax: 234-803-714-6492999
Cubeb Berries

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Fax: +91 9910125250

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Rosemary

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Morocco
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Fax: 0362328413

Sage Leaves

Racinex Sarl
4, Imm Nakhl Rue Oum Rabia Gueliz, Marrakesh, Morocco
Post Code40000
Tel: 212-524-436921
Fax: 212-524-447037

Beni-herb
S, Ctg Sâkjîdh, Casablanca, Casablanca, Morocco

Tel: 212-22-234356
Fax: 212-22-234236

Thyme

Orege Forest Agricultural & Food Products
Postal code 10016 Sokak No: 24 A.o.s.b Cigli, Izmir, Turkey
Tel: 90-232-3280636
Fax: 90-232-3280721

Yafaherbs
Db Afou Rue 16 n58
Casablanca, 20550
Morocco
Tel: 00212 6 65 98 06 98/00212 632 914 024
Email: yafaherbs@gmail.com

Sichuan Peppercorns:

Nanning Great Artist Trading Co., Ltd.(Guangxi, China (Mainland))
Room 2206-08/Tower A, Jiahe Ziyoukongjian, No.18-1 Dongge Road
Nanning, China
Tele: 86-0771-3804870/18178113535
Fax: 86-0771-3804470

Xi’an Pengtime Corporation
Rm B-2-1602, fenglinyishu, keji 6 road, Xi’an 710075
China
Tel/Fax: +86 29 88275684 /86 18629261955

Savory:

Aktas Spice Co.
113/19 Sl. No. 10/7 izyuva Bornova Izmir
Turkey
Tele: 90-533-8102050
Fax: 90- 232-4830532

Pacific Spice Company, Inc
6430 E. Slauson Avenue, Los Angeles
United States
Tel: 1-323-726-9190

http://www.nutrition-.com
http://www.worldmarket.com
http://www.adventuresinspice.com/
http://www.travel-exploration.com/subpage.cfm/Spices
Black Pepper Price Outlook

Naveen.R., Senior Commodity Analyst, Foretell Business Solutions Pvt Ltd

Pepper new crop harvest is round-the-corner in India. During current season, India’s production is projected to be around 73,098 tons, according to IPC, lower by 11,500 tons (14% down). But the domestic and FOB prices of Indian pepper reaction is opposite to the forecast of Indian supply deficit, during current season. The main reason behind the recent weakness in pepper prices can be mainly attributed to the Vietnam pepper production of 162,613 tons, higher by 13,500 tons (8% up). Healthy carryover stocks will avoid/put break on drastic price rise, especially in India. In the below section, one can have technical price outlook for FOB pepper for both Indian and Vietnam origin.

Indian Black pepper FOB prices tested record high of $12,083/ton in the year 2014. Then it remained weak for most part of 2015. Pepper traded in the range of $8733-10344/ton during 2015. Pepper prices could once again claw towards $8000-7800/ton initially. Chart action below 3 & 6 month EMA hint at extension of struggle in prices. Momentum indicators RSI signal room for further slide in prices. Resistance is at $10350/ton and at $11000/ton with support at $8500/ton and at $7800/ton. Buyers could anticipate lower levels of $8000-7800/ton in 3-6 months.

Vietnam Black pepper FOB prices tested record high of $9530/ton, in recent month. At current juncture, it is offered around $9291/ton. Going by chart action coupled with RSI signal, pepper prices are due for healthy correction towards $8000-7500/ton. Resistance is at $9530/ton and at $10000/ton with support at $8000/ton and at $7500/ton.

Conclusion: Indian Pepper FOB prices could gradually claw down towards $8000-7800/ton in coming 3-6 months, despite deficit production. While Vietnam pepper prices could decline to $8000-7500/ton on back on bumper pepper production.
<table>
<thead>
<tr>
<th>Country</th>
<th>Company Name</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Amalgamte International</td>
<td>127/3, Ulon, West Rampura, Dhaka, - 1217 Bangladesh. Email: <a href="mailto:mail@international.com">mail@international.com</a></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Mega International Trading Co</td>
<td>108, Shaheed Tajuddin Ahmed Sharanee, BoroMogh Bazar, Dhaka, Bangladesh. Email: <a href="mailto:megainternational@gmail.com">megainternational@gmail.com</a></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Mermaid Trade International</td>
<td>Head Office Address, Chandercar Bazer, Shibchar, Madaripur, Bangladesh, - 7933, Bangladesh. Email: <a href="mailto:info@mermaidtradeinternational.com">info@mermaidtradeinternational.com</a></td>
</tr>
<tr>
<td>Brazil</td>
<td>Imp E Exp Guriri Ltda</td>
<td>Av Presidente Vargas No 3791 Castanhal - Para- 68740-005 Brazil. Phone: 55-91 37212414, 3721-7024, Fax: 93 3522 4566. Email: <a href="mailto:malcherei@yahoo.com">malcherei@yahoo.com</a></td>
</tr>
<tr>
<td>Brazil</td>
<td>Frudux Alimentos Ltda</td>
<td>Estrada do Barbalho 111 Recife Pernambuco- 50800-290 Brazil. Phone: 55-81 21221855, 55-81 21221844. Email: <a href="mailto:marcosfezzeira@supranor.com.br">marcosfezzeira@supranor.com.br</a></td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Fazendas Sant Antonio</td>
<td>R Orrente, S19 Serra Belo Horizonte- 30220-270 Brazil. Phone: 55-31 32865120, Fax: 55-31 32865120. Email: <a href="mailto:silvohp@terra.com.br">silvohp@terra.com.br</a></td>
</tr>
<tr>
<td>GRENADA</td>
<td>De La Grenade Industries Ltd</td>
<td>PO Box 788, St George's, Grenada, West Indies. Tel: (473) 440-3241</td>
</tr>
<tr>
<td>GRENADA</td>
<td>Superior Foods (Gda) LTD</td>
<td>Monroe Jaloux St George’s, GRENADA. Tel: +473 441-3757</td>
</tr>
<tr>
<td>INDONESIA</td>
<td>Air Emas Samudera, PT</td>
<td>Jln Diponegoro No13 Padang West Sumatera Indonesia. Phone: 62-751 34261, Fax: 62-751 34265. Email: <a href="mailto:oslan@pgvisionetid.com">oslan@pgvisionetid.com</a></td>
</tr>
<tr>
<td>INDONESIA</td>
<td>Mercantile &amp; Herbis Extraction Factory PLC</td>
<td>120323 Addis Ababa Addis Ababa Ethiopia. Tel: +251-1 814574, Fax: +251-1. Email: fabrica@yahoocom</td>
</tr>
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</table>

**International Spices Exporters Contact Details**

<table>
<thead>
<tr>
<th>Country</th>
<th>Company Name</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Absera General Trading</td>
<td>7721 Addis Ababa Ethiopia. Tel: 553819, Fax: 553879. Email: abseradr@telecomnetet</td>
</tr>
<tr>
<td>Brazil</td>
<td>Com Imp E Exp Cepal Ltda</td>
<td>Rua 24 de Outubro, 2164 Santos-21640-010 Brazil. Phone: 93 35224566, Fax: 93 3522 4566. Email: <a href="mailto:absera@ab-sera.com.br">absera@ab-sera.com.br</a></td>
</tr>
<tr>
<td>Ethiopia</td>
<td>ABSERA GENERAL TRADING</td>
<td>7721 Addis Ababa Ethiopia. Tel: 553819, Fax: 553879. Email: abseradr@telecomnetet</td>
</tr>
<tr>
<td>GRENADA</td>
<td>Grenada Co-operative Nutmeg Association</td>
<td>Kirani James Boulevard PO Box 160 St George’s, Grenada. Email: <a href="mailto:gjcanutmeg@spiceisle.com">gjcanutmeg@spiceisle.com</a> Phone: 1-473-440-2117</td>
</tr>
<tr>
<td>GRENADA</td>
<td>Grenada Co-operative Nutmeg Association</td>
<td>Kirani James Boulevard PO Box 160 St George’s, Grenada. Email: <a href="mailto:gjcanutmeg@spiceisle.com">gjcanutmeg@spiceisle.com</a> Phone: 1-473-440-2117</td>
</tr>
<tr>
<td>INDONESIA</td>
<td>Air Emas Samudera, PT</td>
<td>Jln Diponegoro No13 Padang West Sumatera Indonesia. Phone: 62-751 34261, Fax: 62-751 34265. Email: <a href="mailto:oslan@pgvisionetid.com">oslan@pgvisionetid.com</a></td>
</tr>
</tbody>
</table>

**SPICES HANDBOOK - 2016**

76
Bandar Lampung: 35122
Indonesia
Phone: 62-711 350135, 350015
Fax: 62-711 350134
Email: amanjaya_perdana@yahoo.com
Commodities: Black Pepper

Choitram Sakti, PT
JL Angkasa No 20P
Kemayoran
Jakarta Pusat- 10620
Indonesia
Phone: +62 21 4202312/3
Fax: +62 21 4207851
Email: ptsakti@cbnetid
Commodities: White Pepper,Clove

CV Port Numbay International
Propinsi Jawa Timur,Jember
Indonesia
Telephone:62-31-5633181
Mobile Phone:62811344167
Fax:62-31-5670819
Email: sales@portnumbaycom
Fax:62-31-5670819
Telephone:62-31-5633181
Indonesia
Propinsi Jawa Timur,Jember
Indonesia
Telephone:62-31-5633181
Mobile Phone:62811344167
Fax:62-31-5670819
Email: sales@portnumbaycom
Fax:62-31-5670819
Telephone:62-31-5633181
Indonesia
Propinsi Jawa Timur,Jember
Indonesia
Telephone:62-31-5633181
Mobile Phone:62811344167
Fax:62-31-5670819
Email: sales@portnumbaycom
Fax:62-31-5670819
Telephone:62-31-5633181
Indonesia

Divehi Holdings Pvt Ltd
No 07 Charles Place
Colombo 03- 00300
Sri Lanka
Phone: 94112370542
Fax: 94 11 2577741
Commodities: All Spices

Eastern Marchants Ltd
No341, Union Place
Colombo- 02
Sri Lanka
Phone: 94-1 2325736, 2328406
Fax: 94-1 2448474

TANZANIA

Aspi Group Limited
Boko Temboni, Kibaha-20262
Daressalaam
Tanzania
Tel- 255-784-388577
Fax- 255- 766-886223
Commodities: All Spices

Export trading group
9th Floor, Harbour View Towers,
Samora Avenue ,PO Box 10295,
Dares Salaam
Tanzania
Tel - 255 22 211 4474 / 75
Fax-255 22 211 2341

METL Group
20th Floor, Golden Jubilee Towers,
OHIO Street, PO box 20660,
Dar Es Salaam, Tanzania
Tel-55 222 122 830
Email:info@metlnet
Commodities: Cardamom and Nutmeg

Zanzibar State Trading Corporation (ZSTC)
PO BOX 26, Zanzibar
Commodities: Clove and Nutmeg

VIETNAM

A A VILACONIC/anthonyvilaconic@gmail.com
01 Dinh Le Street, Ward 12, District 4
Ho Chi Minh city- 70000
Vietnam
Phone: 84838253078
Fax: 84838268664
Email: anthonyvilaconic@gmailcom/Website: http://agrovilaconiccom/
Commodities: All Spices

An Thai Duong Joint Stock Company
41A Nguyen Phi Khanh St, 01 Dist
Hochiminh- 1234
Vietnam
Phone: 0886906182
Fax: 0886906183
Email: sales@anthaitdoungcom
Website: wwwanthaitdoungcom
Commodities: Black Pepper, White Pepper

An Thai Duong JSC Company
41A Nguyen Phi Khanh St
01 District, HCMC
Ho Chi Minh City- 1234
Vietnam
Phone: +84868906182
Fax: +84868906183
Email: export@anthaitdoungcom
Website: wwwanthaitdoungcom
Commodities: Black Pepper, White Pepper

BBF Co, Ltd
Building Avenis
145 Dien Bien Phu st
Dakao ward, District 1
Hochiminh City
Vietnam
Phone: 84835218301
Fax: 84835218302
Email: hoang@bbfn.com.vn
Website: www.bbfn.com.vn
Commodities: Black Pepper, White Pepper,Cinnamon,Chili,Turmeric,and Ginger

Chanh KhaNg Spices Trading
38-11 Dodoclong Street
Tanquy Ward, Tanpuh Dist
Ho Chi Minh City
Vietnam
Phone: +84-85590409
Fax: +84-82658717
Email: vietnamcinnamon@gmail.com
Website: wwwcassianetfirmscom
Commodities: Black Pepper, White Pepper,Cinnamon,Chili,Turmeric,and Ginger

D N B Cold
1077/784A NGUYEN KIEM STREET, GO VAP DIST,
Ho Chi Minh
Vietnam
Phone: 840839890138
Email: jame@dnbexpresscom.vn
Website: dnbpexpresscom.vn
Commodities: Black Pepper, White Pepper,Cinnamon,Chili,Turmeric,and Ginger
Advertisers

Buhler
Sandeep
12D 13B & 13D, K.I.A.D.B. Industrial Area, Attibele, Bengaluru - 562107, Karnataka, India
Contact: 080-22890000
sandeep.chandrashekar@buhlergroup.com

Cosmic Foods
Piyush
Cosmic Foods 534, 'SONA VILLA' HAL 3rd Stage, 8th main, 7th cross, Bangalore 560075, India
Contact: 9986012431
enquiry@cosmic-foods.com

Jeevika Food Machine Pvt Ltd
Ramya
ramya@jfm.co.in
6/10, 1st Floor, Senthil Andavar St, Dhanalaxmi Colony, Vadapalani, Chennai – 600026, Tamil Nadu
Contact: 04423622750

Ishana Exports Pvt Ltd
Inshaf
37, Old Moor Street, Colombo - 12, Sri Lanka
Contact: 94-77-7363198
inshaf786@gmail.com

Nichrome India ltd.
Mandar Patwardhan
Safire Park Galleria, 4, Pune-Mumbai Road, Shivajinagar, Pune – 411 005, India
Contact: 91 - 20 - 6601 1001
E mail: marketing@nichrome.com

Oceanic Foods Pvt. Ltd.
Jaydeep Bhoot
Opp. Hindustan Lever Ltd., P.N. Marg, Jamnagar – 361002
Contact: 9662508394
sales@oceanicfoods.com

Paras Spices Private Limited
Paras Buddhiraj
V.P.O. Khosa Pando, Zira Road, Moga, Punjab – 142001
Contact: 98148 59823
E mail: virender.singh@parasspices.com

Q Spicing
Robert
Suryacipta City of Industry

JL. Surya Madya kav. A7
Ciampel, Karawang
West Java 41361
INDONESIA
(62).8.1510054288

Synergy Systems
Dr. B. Jacob
Food Quality Laboratory & Research Centre
OS 30 & 31, Illrd Floor, GCDA Complex, Marine Drive, Cochin, Kerala, India - 682 031.
Tel: +91 484 402 6691 / 402 6686
E mail: synergee95@gmail.com

Vasundara sales corporation
Prasannakumar
Golgar kav. post koppa taluk 577 126, chikmagalur, karnataka.
Contact: 9448137029
E mail: golgar2000@yahoo.com

Ventlex
Lukas Veldmeijer
Europaweg 8, 8181 BH Heerde, The Netherlands | P.O. Box 158, 8180 AD Heerde, The Netherlands
Contact: 31 85 303 21 00
E mail: lukas.veldmeijer@ventilex.com

Vidya Herbs Pvt Ltd
chandrashekar
#33 Main , 16 th Cross,
J P Nagar 6th Phase,
Bangalore 560078 India.
Contact: 80 4172 2212
E mail: chandrasekhar@vidyaherbs.com

Indian Spices Exporters

A L Jesvin Impex And Contracting Pvt Ltd
New No 7, Vinayagam Street, Mandaveli
Tamil Nadu. Pin: 600028
Phone: 04424611418, 9841568001
Email: jevan@aljesvin.com

A Nairn Mohamed
2F/72, Sanjay Flats, Vayalure Road
Kumarar Nagar, Tamil Nadu. Pin: 620017
Phone: 0431 2770344
Email: anainarmohd@gmail.com

A R Enterprise
VILL Mukundakati, PO Itinda PS Basirhat,
West Bengal. Pin: 743292
Phone: 08927932229
Email: aminurrahaman1968@gmail.com

A To Z Exports and Imports
83 Padma Illam, White Betal Street, Tamil Nadu. Pin:620008
Phone:0431 2709649, 9443185340
Fax:0431 2709649
Email:bkrishatozexports@yahoo.com

A.M.Ahamed & Co
No.205, (Old No.99), Linghi Chetty Street, Tamil Nadu. Pin: 600001
Phone:044-25230066
Fax:044-25219584
Email: ahamedco@vsnl.com
hochennai@ahamed.com
Commodities: Chilli And Turmeric

Aaradhya Impex Pvt Ltd
36/72a/2/1, F NoG1, Nalanda Resd, 4th Line, Brundavan Gardens, Andhra Pradesh.
Pin: 522006
Phone: 0863 2257007
Email: skponnam@gmail.com
Commodities: Red Chilli and Red Chilli powder

Abad Foods
TC 9/328 12, LA4, Jawahar Nagar, Kerala.
Pin: 695 003
Phone: 0471-2315885
Fax: 0471 2314848
Email:exports@thefinessegroup.com

ABS Food Ingredients
BB81, Wall Street-2, Near Gujarat College, Ellisbridge, Gujarat.
Pin: 380006
Phone: 079-26401619
Fax: 079-26401619
Email:absfood@vsnlnet

Abyssinia Impex
A-2, Kanara Business Centre, Behind Everest Gardens Bldg, Laxmi Nagar, Link Road, Ghatkopar East, Maharashtra.
Pin: 400075
Bhanu Chilies Corporation  
18/5/138, Thotlawada, Karimabad, Telangana  
Warangal. Pin: 506002  
Phone: 9390100940  
Email: bhanuchillies@gmailcom  
Commodities: Chilli  

Bhavesh Trade Links  
07 / 03, K-16 (A), Sector 1E, Kalamboli, Near  
Mcdonalds, Maharashtra. Pin: 410218  
Phone: 022-27842949  
Fax: 022-27842950  
Email: bttexports@hotmailcom  

Big Fly Hygiene Products Ltd  
Survey No65/P18, 8 B, National Highway,  
At Shemla , Tal, Gondal, Dist Rajkot, Shemla  
Gujarat. Pin: 360311  
Phone: 02825 280333  
Email: bhplraj@gmailcom  

Bikaner Mirch Bhandar  
Shop No106, New Anaj Mandi, Rajasthan  
Pin: 334001  
Phone: 01512251494  
Email: trading@bismerabbikcom  

Bimala Spices Food Industries (P) Ltd  
9-4-80/1, Nanal Nagar, lind, Lancer Road,  
Nanal Nagar, Andhra Pradesh. Pin: 500008  
Phone: 04023512570, 9000374033  
Fax: 04023521657  
Email: info@bsfspicescom  

Bioprex Labs  
Shop No 3&4 Ground Floor, Ambience,999  
999 Sadashiv Peth, Maharashtra. Pin: 411030  
Phone: 8888556779  
Email: info@bioprecom  
Commodities: Pepper, cumin and Cardamom  

Bittu Chanachur Co  
Badurtalla, Po-Jiaganj, Murshidabad, West  
Bengal. Pin: 742123  
Phone: 03483255321, 9434923590  
Email: subhash Jain05@yahoooin  

BJ Agri Comm  
121/127, Mandvi Navijivan Bldg,Suit No 303  
Kazi Sayed Street, Maharashtra. Pin: 400003  
Phone: 022 23444403  
Fax: 022 23421142  
Email: info@bjjintcom  

BLS International  
204, 2nd Floor, Plot No 7A, Above Shalimar  
Hotel, Apmc Market, Road Sector 19C, Vashi  
Maharashtra. Pin: 400703  
Phone: 022 27842213  
Fax: 27842212  
Email: biginternational@yahooocom  

Blossom Grocery & Foods India PvtLtd  
1001/10th Floor, Natasha Tower, Sector 17 ,  
Plot B4, Maharashtra. Pin: 400 709  
Phone: 022 40851300, 27834928  
Fax: 022-27652421  
Email: exports@blossomgroceriescom  

BMS Exports  
689 Shri Anandam Nilayam, Big Bazaar Street  
Tamil Nadu. Pin: 641001  
Phone: 0422 2344689  
Fax: 0422 2423949  
Email: bmsexports1@yahooocom  

BMS Tradecorp Pvt Ltd  
F/No 201, Dhatolli, Laxmi Keshav Apts, Near  
Garden-Abhyankar RD, Dhontali Park, Corner  
Maharashtra. Pin: 400412  
Phone: 0712 2423949  
Email: md@bmstradecorpcom  
Commodities: Tamarind  

Brahmins Foods India PvtLtd  
IX/584, Mini Industrial Estate, Road  
Manakkad PO, Kerala. Pin: 685608  
Phone: 04862 223561  
Fax: 04862 223561  
Email: export@brahmingsgroupcom  

Brihat Consultants India Pvt Ltd  
No15,Saint John De Britto Street, Pondicherry  
Pin: 605001  
Phone: 413 4205189  
Email: brihatcoin@gmailcom  

Brij Kishore Prasad  
Ashrampara, Pakurtalamore, Muzzaffar  
Ahmed Sarani, West Bengal. Pin: 734001  
Phone: 0353-2640116  
Fax: 0353 2642240  
Email: slgexport@hotmailcom  

BSR Foods  
Survey No 45P/1, Old Ratol Road, Talgajarda  
Gujarat. Pin: 364290  
Phone: 0987 9461716  
Email: info@bsrfoodsin  
Commodities: Garlic  

BSS Foods and Spices Private Limited  
Plot No71,New Grain Market, GT Road,  
Jandiala Guru, Punj. Pin: 143115  
Phone: 0183 2432234, 9803400005  
Fax: 0183 2432034  
Email: bssfoods@gmailcom  

BSS Worldwide Pvt Ltd  
B / 4, Yoganand Appt, 41 New Jagnath Plot,  
Opp Race Cource, Gujarat. Pin: 360001  
Phone: 0281 3209584/86  
Fax: 0281 3047008  
Email: pranav@bssworldwidecom  

BTC Aagro Spices  
No13, 1-2nd Cross Road, Leigh Bazaar, Tamil  
Nadu. Pin: 636009  
Phone: 9894807803  
Fax: 0427 2480938  
Email: btturmerictrading@hotmailcom  

BTL Herbs & Spices Pvt Ltd  
536, Commodity Exchange Building, 5th  
Floor, Plot No2,3&4, Sector 19-A, Vashi,  
Maharashtra. Pin: 400705  
Phone: 022 27842949  
Fax: 022 27842950  

Bush Tea Company Pvt Ltd  
Block -G, 3, Hide Road, West Bengal. Pin:  
700043  
Phone: 033 24391966  
Fax: 033 24391927  
Email: suvajectchoudhury@ambootiacom  

Business Navigators India  
No71, Adayar Gandhi Nagar, 1st Main Road  
Chennai Tamil Nadu. Pin: 600 020  
Phone: 044- 24357443  
Fax: 044-24357443  
Email: vlimpex@gmailcom  

BV Corporation  
2920/Xvi/21, Kot Sardar Khan, O/S Lahori Gate  
Punjab. Pin:143006  
Phone:01832510233  
Fax: 044- 24357443  
Email: info@bvcorpooin  

Capital Dehydration  
Survey No 261 NrRaj Ginning, Girgadhda  
Punjab. Pin:143006  
Phone:01832510233  
Fax: 044- 24357443  
Email: info@capitaldehydrationcom  

Capital Foods Private Limited  
Villa Capital, Villa Capital, Sadhana  
Compound, Jogeshwari West, Maharashtra  
Pin: 400102
### Spices Exports and Imports - India

#### Cardamom Oleoresins Export

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (Tonnes)</th>
<th>Values in US $ Million</th>
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<tbody>
<tr>
<td>2003-2004</td>
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<tr>
<td>2004-2005</td>
<td>1.82</td>
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<td>2005-2006</td>
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<td>2014-2015</td>
<td>11.4</td>
<td>0.95</td>
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<td>2015-2016(Apr-Nov)</td>
<td>6.87</td>
<td>0.60</td>
</tr>
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</table>

#### Clove Leaf/ Stem Oil Export

<table>
<thead>
<tr>
<th>Year</th>
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#### Pepper Neither Crushed Nor Ground Export

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### BLACK PEPPER UNGARBLED EXPORT

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### LIGHT BLACK PEPPER IMPORT

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## Spices Exports and Imports - India

### Cumin Oil Import

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### Nutmeg Oil Import

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### Name of the Commodity HS code

- Cardamom Oleoresins: 33019015
- Pepper Neither Crushed Nor Ground: 090411
- Pepper Oleoresins: 33019013
- Clove Leaf/Stem Oil: 33012921
- Coriander Of Seed Quantity: 090922
- Seeds Of Coriander: 090921
- Cumin Oil: 33012945
- Cumin Oleoresin: 33019024
- Nutmeg: 090811
- Nutmeg Oil: 33012932
- Turmeric (Curcuma): 091030
- Turmeric Oleoresins: 33019014
- Chilli Powder: 09042020 and 09042211
- Green Chilly: 07096010
- Pepper Long: 09041110
- Black Pepper Ungarbled: 09041140
- Light Black Pepper: 09041120

Source: DGFT
## Vietnam Pepper Production and Exports

### VIETNAM PEPPER AREA & PRODUCTION

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### Vietnam Pepper exports

<table>
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#### VIETNAM PEPPER EXPORTS TO UNITED STATES

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#### VIETNAM PEPPER EXPORTS TO SINGAPORE

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</table>

Source: IPC, DGFT and Vietnam customs.
A COMMITMENT TO QUALITY REFINED BY YEARS OF EXPERTISE

PARAS, The Trusted Spice Partner of Globally Renowned Food Companies

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- Steam Sterilised/Low Microbial Load Spices
- Backward Integration & IPM Spices
- Stringent Foreign Body & Metal Contamination Control
- National & International Compliances & Certifications
- In-Depth R&D

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Regd. Office & Works: V.P.O., Khosa Pando, Zira Road, Moga-142001, Punjab, India. Ph.: +91 1636 237177
Corp. Office: 205 (2nd Floor), Bhikaji Cama Bhawan, Bhikaji Cama Place, New Delhi-110060, India. Ph.: +91 11 26162177
E-mail: welcome@parasspices.com • Web: www.parasspices.com
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Innovations for a better world.