

IFEAT SOCIO-ECONOMIC REPORT

PEPPER

THE KING OF SPICES

INTRODUCTION

Black pepper (*Piper nigrum*), popularly known as the 'king of spices' is a flowering vine in the family Piperaceae, which is cultivated for its fruit (berries). Also known as 'black gold', it is the world's most traded spice and is one of the most commonly used spices in cuisines across the globe.

Black pepper contains a chemical compound called piperine which imparts a unique spiciness, which is different from the characteristic capsaicin spiciness of chilli.

Pepper is largely produced as black pepper and is the dried whole fruit, whereas white pepper is produced with additional processing and removal of the outer pericarp. Pepper is also available in other forms such as crushed, ground, green and ripened pepper pickled in brine, dehydrated green pepper, and preserved red pepper. Other value-added products such as pepper oil and pepper oleoresins are also available on the

market. While pepper is mainly used as a spice and flavouring agent in the food industry, it has industrial uses in the pharmaceutical industry and in perfumery.

In the distant past, black pepper was used as a currency for transactions. The Romans considered black pepper to be something special, and they imported the spice from India (Kerala, South India) in large quantities via Arabian traders. The increase in imports of black pepper once pushed the Roman Empire into debt and led to a royal decree banning the import of pepper to the Empire. Although empires withered and eventually perished, pepper continued to emanate its fragrance for generations across continents. In fact, it was in his search for black pepper that Vasco da Gama arrived in Kerala and this led to the colonisation of India and parts of Asia that changed the geo-politics of the world whose impact is seen even today, centuries later. It was in search of black pepper that Christopher Columbus "went the other way" when

discovering the New World. Hence it would not be out of place to suggest that black pepper was responsible for civilisations being connected across the world.

In Kerala, pepper plants are quite common in home gardens because pepper is traditionally used for cooking and in Ayurvedic medicine. Malabar garbled pepper is considered the best quality pepper globally for its taste, pungency and aroma. Tellicherry pepper is considered exceptional for its earthy, fruity notes and is known as the finest peppercorn in the world. It remains one of the few names in pepper that people are familiar with.

GROWTH AND HARVEST

The pepper plant is a woody perennial vine which can grow eight to ten metres high on supporting trees, poles or trellises. The plant grows well in tropical, hot and humid weather conditions with an ideal temperature of 24 to 30 degrees Celsius and grows in a wide spectrum of soils such as

sandy loams, clay loams, red loams, etc. The best region to grow the crop is between 20° north and 20° south of the equator and it is interesting to note all the top pepper growing regions (Indonesia, Vietnam, India, Sri Lanka and Brazil) are in this region. On the other hand, the countries within these regions are either developing or are yet-to-be developed nations. Since they are not adept at exporting high-tech items and allied services, the revenue earned from the export of spices is a boon for those countries.

Pepper is usually propagated vegetatively using cuttings that are about 40 to 50 cm long. The cuttings are planted at a spacing of two metres by two metres (about 2,500 pepper vines per ha) and tied to poles or trees. Trees with rough bark are favoured, as the pepper plants climb on rough barks more easily. After propagation, it takes about three to

four years for the pepper plant to become productive.

India and Sri Lanka follow an intercropping system for pepper cultivation whereas Vietnam follows monocropping (the difference is in the number of plants in a particular area under cultivation). Vietnamese farmers also take care of their vines with regular fertigation and as a result, the productivity in Vietnam is at least four times higher than that of India. Meanwhile, in Indonesia, a mix of both intercropping and monocropping is followed for the pepper crop.

Large-scale cultivation of pepper as a monocrop is done on hill slopes by clearing jungle areas and planting standards for the vines to climb up. As an intercrop, it is grown with areca nut, coconut, nutmeg, cocoa, etc., where these trees serve as standards for the pepper vines. Pepper is also a suitable

intercrop in coffee estates where the shade trees provide good standards for them.

Karimunda and Panniyur pepper varieties (from Kerala, India) are the most preferred varieties for cultivation in all of the countries mentioned above, along with their locally modified varieties.

It takes about seven to eight months after flowering for the black pepper to reach full maturity. The harvest period for pepper in India is from December to January in the plains and from January to April in the high ranges of Western Ghats. Sri Lanka has two harvesting seasons; the main season is from June to August and the second season is from November to February. In Vietnam, harvesting happens from December to March and in Indonesia from June to September.

Countries	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Vietnam												
Indonesia												
India												
Sri Lanka												

PRODUCTION AND PROCESSING

The berries or fruits are picked when they begin to turn yellow/red. After harvesting, to separate the berries, the peppercorns are threshed manually or by a mechanical thresher. Fresh pepper is then dried under the sun or using artificial dryers for three to four days and is then cleaned and sieved to get clean graded pepper. White pepper is produced by immersing fully ripened berries in water for about five to six days until the seed coat is rotten. The seed coat is then removed by rubbing on a wire mesh or by a mechanical decorticator.

80 to 85% of the harvested green/ ripened pepper is dried under the sun and the remaining quantity is dried with mechanical support. Generally, farmers and their family members are engaged in the process as sun drying is done either at their farm sites or in drying yards. Post-harvest operations of pepper in all the origins follow the same system. After drying

the farmers sell their produce either to local agents or traders. In Sri Lanka, harvested green pepper is also sold in open markets where processors buy it for drying at their end.

According to latest estimates, pepper production across the globe should exceed 540,000 MT during 2021, comparatively lower, dropping from 580,000 MT in 2017.

Member countries of the International Pepper Community (IPC) such as India, Indonesia, Sri Lanka, Vietnam, and Malaysia contribute to around 71% of the world's total pepper production. Non-IPC countries like Brazil, China, Thailand, Madagascar, Cambodia and Ecuador contribute the remaining 29%. Total production of the IPC countries is estimated to be around 383,000 MT in 2021, while non-IPC countries produce around 157,000 MT.

Export earnings from pepper by IPC countries amount to roughly US\$ 950 million (2020), which excludes

earnings from the export of value-added products such as pepper oil and oleoresin. On the other hand, the corresponding earnings by non-IPC countries totals US\$ 270 million (2020). Vietnam tops the production table with more than 200,000 MT (43%) while Brazil (15%), Indonesia (11%), India (11%), Malaysia (4%), Sri Lanka (4%) and China (6%), take the next respective ranks. This includes both black pepper and white pepper production. Indonesia is the largest producer of white pepper, converting about 50% of its pepper production to white pepper. China converts the maximum quantity of its black pepper (about 90-95% of the total volume) to white pepper whilst production in other countries is considerably less.

In Vietnam, pepper is cultivated over an area of 140,000 to 150,000 hectares (ha) to produce a total volume of approximately 223,000 MT. The area under cultivation in Indonesia is about 113,000 ha with a production of about 64,500 MT. In



India, peppercorn is grown in 130,000 to 140,000 ha and the total volume is 60,000 to 65,000 MT. In Sri Lanka, the area is about 40,000 to 43,000 ha.

Yield per ha varies according to the soil, weather conditions, fertiliser, and pesticide applications. Pepper production per ha in India and Sri Lanka are at a similar level - estimated to be 500 to 1,000 kgs. Indonesia reports around 700 to 1,100 kgs yield per ha, whereas Vietnam has the highest productivity of 2,500 to 3,000 kgs per ha. In India and Sri Lanka, the average pepper planting area per farmer is about 0.2 to 3.50 ha while in Indonesia, most of the farmers have a holding of about one to three ha and a small percentage with land size up to five ha. As per secondary reports, the average pepper planting area per farmer in Vietnam would be classified into three: small farmers from one to two ha, medium farmers three to five ha and large farmers around 10 to 15 ha.

SOCIO-ECONOMIC CHARACTERISTICS

As per reports, the cost per ha for pepper cultivation in India, including land preparation, plantlets, manure and fertilisers, labour, irrigation, packing, etc. would be around US\$ 2,800 for the first four years until the plants reach their productivity stage. If we consider an average production of 600 kg per ha, after four years, at a base price of US\$ 6 per kg, a farmer can earn up to US\$ 870 per ha annually, while in Vietnam, farmers earn a margin of approximately US\$ 1,800 to 2,200 per ha from a well-maintained farm. In Indonesia, farmers earn an average of US\$ 0.80 to US\$ 1.10 per kg after deducting their cultivation and post-harvest operational expenses, i.e., if we consider a MT production per ha, it amounts to US\$ 800 to US\$ 1,100 per ha. Whilst in Sri Lanka, the income for farmers would be around US\$ 700 to US\$ 800 per ha. It should be noted that the returns for the farmer are determined by market prices and market fluctuations.

The International Pepper Community (IPC) plays an important role in supporting pepper farmers in the major pepper producing countries. In India, the Spices Board and All India Spice Exporters Forum (AISEF) work towards promoting the lives of pepper farmers. The IPC has taken many initiatives for sustainable and eco-friendly pepper cultivation in all origins. The IPC's Farmers' App, with multi-language options, has received wide acceptance among farmers and is currently used by thousands of farmers from all origins. The Farmers' App gives ideas on good agricultural practices, pest and disease control, information on selling platforms, traders, training videos, daily market prices, etc.

Major companies in the industry are also working towards promoting sustainable supply chain practices in many parts of the pepper producing regions across the globe. An example is the Rainforest Alliance Certification Program along with World Spice



Organisation and AISEF, to promote sustainable pepper in India, Sri Lanka, Indonesia, and Vietnam. Under this programme, they partner with the farmers, guide them on good agricultural practices, educate them on the use of approved fertilisers and pesticides, provide technical assistance, etc. There are also projects undertaken to improve the productivity and quality of pepper by integrated pest management (IPM) practices. Such quality improvements in pepper should promote the export possibilities and enhance the revenue of millions of pepper farmers, compared with their returns from conventional cultivation.

Black pepper and white pepper production across the globe

generates a wide range of employment and gives a livelihood to millions of farmers, agricultural labourers, agronomists, traders, exporters, and food processing industries. Based on industry estimates, the crop provides a livelihood to about two to two and a half million people in the top pepper producing countries. In Vietnam, the largest producer of pepper, there are around 70,000 to 75,000 farmers engaged in pepper cultivation and related activities. Sri Lanka is also at a similar level with nearly 65,000 to 70,000 farmers involved. India has the largest number of cultivators/ farmers at around 200,000 to 250,000, followed by Indonesia with close to 100,000 farmers.

VALUE ADDITION

The various products from peppercorn can be broadly classified into four types:

1. Whole – whole pepper, in brine, dehydrated, frozen, sun-dried
2. Powdered – crushed, ground (both black and white pepper)
3. Extracts – pepper oil, oleoresin
4. Isolates

In all of the top pepper producing countries (except India), 85 to 90% of the exported pepper is in its whole form as most countries import whole berries and convert them into powder.

Manufacturers and food processors also prefer whole black pepper because the flavour of the original spice is retained.

In addition to black and white peppercorns, there is also a market for green pepper, which comes from fully developed immature pepper berries. These can be preserved in brine or vinegar for retaining the natural colour/texture of the berries and used in culinary applications to give a zesty flavour to food. Another product is dehydrated green pepper which is a premium quality pepper processed by air-drying fresh green pepper berries, retaining its colour, and producing the best flavour.

Next in the value chain is crushed/ ground pepper, which is dried pepper berries that are commercially ground based on the required specification of particle size, pungency, etc. With every stage of value addition, the price and margin increases. The addition in value comes with a proportional increase in effort and risk in terms of technology investment, processing/manufacturing, infrastructure and increases in other resources.

The extraction industry is the next stage of value addition. Pepper oleoresin is a resinous, concentrated extract of pepper that is obtained

by conventional solvent extraction or supercritical extraction. On the other hand, pepper oil is a volatile oil obtained by steam distillation, which is responsible for the aroma of pepper. Around 95% of the global production of pepper extract is contributed by extraction companies situated in South India. Around 1,750 to 2,250 MT of pepper oleoresin and 100 to 125 MT of pepper oil, valued at just over US\$ 70 million and US\$ 6 million respectively. Furthermore, highly pure isolates of pepper find their use in nutraceutical and pharmaceutical applications, with current production levels of around 50 to 75 MT in India. In terms of application, almost 90% of pepper (whether black, white, ground, in brine, dehydrated, etc) is mainly used as an ingredient/flavouring agent in different kinds of food and beverage. Another 5% is used in perfumery and flavouring in the form of pepper oil with the remaining being used in the nutraceutical industry.

CONCLUSIONS

New origins for pepper such as Cambodia, Malaysia, and parts of Africa will grow and contribute significantly to pepper production. However, there has been a gradual price reduction for both black and white pepper from 2016 to 2020 and the prices plummeted to their lowest in the last decade. Since pepper prices slipped to rock bottom

levels, pepper farmers in many origins, especially in Vietnam, either destroyed the crop or left them unattended. From 2021 to 2022 we expect this tide to be turned and prices are expected to increase over the next two to four years.

Pepper has been placed as the "king of spices" because of its taste, aroma, and medicinal properties, along with its wide use in various cuisines around the world. However, climate change is posing a threat to its growth, which urges the farmers to adopt novel technologies and agricultural activities, and scientists to produce new varieties of pepper that can withstand climate change. Erratic weather conditions like El Niño and La Niña phenomena are a concern for pepper production but so far the effects have not resulted in the complete destruction from any origin.

For the pepper industry to remain competitive, the cost of production per unit output must be reduced. Labour is the most expensive input in pepper cultivation. Other than during the first year of planting, most of the labour is required for harvesting. Productivity and the quality of pepper can be improved by adopting modern concepts such as eco-friendly sustainable farming, labour efficient operations, mechanisation, and effective supply chain management combined with IPM practices. Through establishing partnerships with the "farmers-public-private" trio, producing nations can attain higher revenues, enhance farmer income and uplift their living standards.

SOURCES AND REFERENCES

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BLACK PEPPER FOB PRICES AT MAIN ORIGIN - USD/MT

