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## A Review on Coffee Cultivation in India

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**Abstract:** *From the initial date of introduction of Coffee in India, several studies have been made on Coffee cultivation by Coffee Board, Research scientists/organizations, market researchers etc., In a liberalized economy, globalization and privatization play a very important role in coffee production and exports. In the coffee industry, mainly the coffee growers are facing various problems related to output and marketing issues. In this regard the purpose of this paper is to provide a handful of information which helps the cultivators and researchers to go for new strategies for the better profits.*

### **I. Introduction and Journey of coffee in India:**

The history (and origin) of coffee in India dates back to around 1600 AD, when the Indian Sufi saint, **Baba Budan**, went on a pilgrimage to Mecca who made a 'legendary' journey from **Mocha**, a port city of Yemen that overlooks the Red Sea, to his homeland. Besides being a trading hub for coffee, Mocha was the source of the popular Mocha coffee beans. Baba Budan discovered coffee in the form of a dark and sweet liquid called Qahwa1 on the way. He found the drink refreshing and secretly brought back seven coffee beans from Mocha by strapping them to his chest, since the Arabs were extremely protective about their coffee industry.

*Baba Budan's Courtyard in Chikmagalur was considered to be the Birthplace & Origin of Coffee in India.* After returning from his pilgrimage, Baba Budan planted the Seven Seeds of Mocha in the courtyard of his hermitage on 'Baba Budan Giris' in **Chikmagalur, Karnataka which has become the birthplace and origin of coffee in India**. The coffee plants gradually spread as backyard plantings, and later on to the hills of what is now known as **Baba Budan Hills**. For quite a considerable period, the plants remained as a garden curiosity and spread slowly as back yard plantings.

Coffee cultivation grew and thrived in India during the British rule and beyond. It was during 18th century that the commercial plantations of coffee were started and our nation is thankful to the success of British entrepreneurs in conquering the hostile forest terrain in south India. Since then, Indian coffee industry has made rapid strides and earned a distinct identity in the coffee map of the world. The Dutch began to grow coffee in the Malabar region, but a major transition happened when the British led a relentless drive to set up **Arabica coffee plantations** across the hilly regions in South India, where they found the climatic conditions to be apt for the crop.

Commercial coffee plantations in India started with an ambitious and enterprising British manager named JH Jolly, **Parry & Co.**, a trading company who felt that the coffee beans growing in the plantations of Chandragiri had huge potential, and sent a petition to the Mysore government of the day for **40 acres of land** to grow coffee.

The success of this endeavor encouraged more people to take the plunge into the coffee plantation business, and led to the proliferation of plantations across the region. Slowly but steadily, a vibrant ecosystem also began to evolve<sup>2</sup>.

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## II. Journey of Coffee as a commercial Crop:

Commercial plantations of coffee started in India during the 18th century. Over the years, the Indian coffee industry has earned a distinct identity on the coffee map of the world. India is the only country in the world where all coffees are grown under a 'well-defined two-tier shade canopy of evergreen leguminous trees'. India is today home to 16 unique varieties of coffees sourced from 13 distinct coffee growing regions; most of them in the southern part of the country. The different varieties of Indian coffees are well suited for cappuccinos and espressos alike and have no parallel in any other coffee growing nation globally. India's coffee regions are one of the 25 biodiversity hotspots in the world.

The coffee industry suffered a huge setback during the Great Depression. The government stepped in by setting up the Coffee Cess Committee, which later became the Coffee Board of India. Initially, the Board provided funding to exporters. When **World War 2** sealed export routes, the board began to buy coffee from planters, and took upon itself the responsibility of marketing the produce.

Collection of coffee produce was the norm in the initial decades of independent India. However, the coffee industry gathered pace in the **post-liberalisation** era (i.e. after 1991), when the government allowed coffee planters to market their own produce, rather than selling to a central pool.

Fluctuating prices, lack of market information, lack of efficient management, malpractices at the market place are the other problems faced by these growers at the marketing stage. Taking into account the above mentioned various problems of the coffee industry, the present research work has been conducted to make a separate and an in-depth study of the problems and prospects of the coffee industry, to study the problems and prospects of the coffee industry.

## III. Global Scenario of Coffee Production:

Coffee is mainly produced in Brazil, Columbia, Mexico, in addition to African Countries such as Ethiopia, Uganda, Honduras, Castalia, Peru etc. alongside Asian nations like Vietnam, Indonesia and India. With respect to crop year of 2012-13, total coffee production was to the tune of 145 million bags (60kg each), of which Arabica production accounted 59%, while Robusta contributed the remaining 41%. In terms of world production in 2012-13, Brazil ranked highest, accounting for 35% of global coffee production, followed by Vietnam (15%), Indonesia (9%), Columbia (6%), Ethiopia (6%), and India (4%).

## IV. Indian Scenario:

### (i). Coffee cultivation in India:

**Iyengar (1959)** estimated the economics as while in India area under coffee is about 2.5% of the world's area, production is only about 1%. **Satyanarayana (1954)** analyzed according to States, the average yields in Coorg are easily the highest and those of Madras are the lowest, both in respect of Arabica and Robusta. The main reason for such a disparity may probably be the greater attention that is being paid to Coorg for cultivation and larger manuring and spraying up of the coffee estates.

Today, India is home to 16 unique coffee [varieties](#).

- Indian coffee is grown under a canopy of thick natural shade in ecologically sensitive regions of the **Western and Eastern Ghats**.
- [Indian coffee](#) is traditionally grown in the Western Ghats spread over **Karnataka, Kerala and Tamil Nadu**.
- Coffee cultivation in India has **expanded rapidly** to non-traditional areas like:
  - Andhra Pradesh and Odisha on the Eastern Coast
  - Assam, Manipur, Meghalaya, Mizoram, Tripura, Nagaland and Arunachal Pradesh in the North East

There are basically **two types of coffee** consumed most commonly worldwide - **Arabica** and **Robusta** - that grow from the two main species of coffee plants: *Coffee Arabica* and *Coffee Robusta* respectively. Although

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there are numerous varieties of coffee plants, Arabica and Robusta are the most important from a commercial standpoint.

Coffee is a very important commercial crop for Indian farmers. Among all the major Coffee growing states of India, Karnataka occupies the top position. The cultivation of Coffee is comparatively of latest origin but it has developed with great rapidity.

Coffee cultivation in Southern India is carried out principally in the Waynad on the Nilgiris in Mysore, Coorg and Travancore. A considerable position of the exports of the Madras Presidency consists of Coffee from Coorg and Mysore. These areas were considered the traditional Coffee growing areas. In 1961, the Forest department started commercial Coffee cultivation in the agency areas of Visakhapatnam district. Since coffee is not a traditional crop of these farmers and the land being completely a forest land, additional efforts have been required on part of the Coffee Board to promote Coffee cultivation in these areas.

#### **(ii). Coffee Production on commercial scale:**

Coffee is one of the world's most popular beverages. It is farmed in 80 countries and exported by over 50 nations spanning Central and South America, Africa and Asia. India is the eighth largest producer of coffee in the world, following Brazil, Vietnam, Indonesia, Colombia, Ethiopia, Honduras and Peru.

Owing to its diverse climatic conditions, India produces both Arabica and Robusta types of coffee, wherein their production in Coffee Season (CS12-13) was in the ratio of 31:69. On an average, approximately 80% of the coffee produced in India is exported. Approximately, six lakh laborers are directly employed in coffee plantations, while an equal number are estimated to be employed indirectly in allied and ancillary activities.

The area under coffee cultivation is around 3,40,306 hectares, with a ratio of about 50/50 of Arabica and Robusta coffee. The annual yield is approximately 300000 M.T. About 70 per cent of the produce is exported. Around 98 per cent of the plantations are owned by small growers who own less than 10 hectares of land<sup>3</sup>.

Coffee production in India grew rapidly in the 1950s, increasing from 18,893 tonnes in 1950-51 to 68,169 tonnes in 1960-61. Growth in India's coffee industry, however, has been especially robust in the post-liberalisation era, backed by the government's decision to allow coffee planters to market their own produce, rather than selling to a central pool. Coffee production in India stood at 348,000 metric tonnes (MT) in 2015-16. Robusta variety accounted for 244,500 MT (70.3 per cent) of this production, while Arabica accounted for 103,500 MT (29.7 per cent). The post-blossom estimate for 2016-17 is 320,000 MT (100,000 MT of Arabica and 220,000 MT of Robusta) India has emerged as the seventh largest coffee producer globally; after Brazil, Vietnam, Columbia, Indonesia, Ethiopia and Honduras. It accounted for 2 per cent of the area under production and 3.7 per cent of the production in 2012 as compared to 3.18 per cent of production in 1992-93. In 2015-16, India accounted for 4.05% of global coffee production.

The area under coffee plantations in India has increased by more than three times, from 120.32 thousand hectares in 1960-61 to 397.147 thousand hectares in 2015-16. Most of this area is concentrated in the southern states of Karnataka (54.95%), Kerala (21.33%) and Tamil Nadu (8.18%). Productivity has also improved from around 567 kg/Ha in 1961 to around 876 kg/Ha during 2015-16. For the traditional areas, productivity has grown from 412 kg/Ha in 1961 to 1,008 kg/Ha in 2015-16. The industry is driven by the enterprise of around 280,241 coffee growers, out of which 99% are small growers, while 1% are medium to large growers. These plantations employ an average of around 632,993 people on a daily basis, as per estimates for 2015-16.

Coffee is an export driven commodity in the country with nearly 80% of the total production being exported. During CY13, India's coffee export in quantity terms was up by about 2.7% on a year-on-year basis mainly because of increased exports to countries like Germany and Italy. The exports of Robusta cherry contributed approximately 44% to the total export quantity in CY13. The other major contributors to export were instant coffee and plantation coffee with the share of 30% and 14%, respectively. In volume terms, Italy maintains leadership as prime Indian export destination, followed by Germany, Russian Federation, Belgium, Turkey, whereas, USA comprises around 2% of export share in volume terms.

**Table: Production in Major States/Districts Of India(in MTs)**

State/District	Final Estimate 2017-18		
	Arabica	Robusta	Total
<b>Karnataka</b>	<b>69,025</b>	<b>153,275</b>	<b>222,300</b>
<b>Kerala</b>	<b>2,160</b>	<b>63,575</b>	<b>65,735</b>
<b>Tamil Nadu</b>	<b>13,400</b>	<b>4,040</b>	<b>17,440</b>
<b>Non Traditional Areas</b>			
Andhra Pradesh	9,580	20	<b>9,600</b>
Orissa	740	0	<b>740</b>
North Eastern Region	95	90	<b>185</b>
<b>Grand Total (India)</b>	<b>95,000</b>	<b>221,000</b>	<b>316,000</b>

Source: Coffee Board of India

**Chand (1991)** analyzed that about the competitiveness and export performance of the Indian agriculture and the policy change due to Trade reform like reducing control on the exchange rate and export process leads to increase in export performance. Various odds like Technical Barriers to Trade and sanitary/Phyto-sanitary and infrastructural bottlenecks etc. are the main determinants for the better export growth of livestock, horticultures.

## V. Climatic Factors and Environmental Requirements:

Rainfall requirements depend on the retention properties of the soil, atmospheric humidity and cloud cover, as well as cultivation practices. The optimum annual rainfall range is 1200-1800 mm for arabica coffee (Alègre, 1959). A similar range seems to be required for robusta, although it adapts better than arabica to intensive rainfall exceeding 2000 mm (Coste, 1992). For both species, a short dry spell, lasting two to four months, corresponding to the quiescent growth phase, is important to stimulate flowering (Haarer, 1958). Abundant rainfall throughout the year is often responsible for scattered harvest and low yields. Lack of a dry period can also limit coffee cultivation in lowland tropical regions (Maestri and Barros, 1977).

The optimum mean annual temperature range for arabica coffee is 18-21 °C (Alègre, 1959). Above 23°C, development and ripening of fruits are accelerated, often leading to loss of quality (Camargo, 1985). Relatively high temperature during blossoming, especially if associated with a prolonged dry season, may cause abortion of flowers (Camargo, 1985). Robusta is thus much less adaptable to lower temperatures than arabica coffee.

Air humidity has a significant impact on the vegetative growth of the coffee tree. Robusta successfully grows under high air humidity approaching saturation, or in less humid sites, provided that the dry season is short. By contrast, arabica coffee requires a less humid atmosphere, comparable to that of the Ethiopian highlands (Haarer, 1958; Coste, 1992).

In coffee plantations subjected to large wind shears and advection, crop yield is usually depressed. Wind stress may lead to a reduction of leaf area and internode length of the orthotropic and plagiotropic branches (Caramori et al., 1986), in addition to severely damaging leaves and buds and exacerbating shedding of developing flowers and fruits (Camargo, 1985; Matiello et al., 2002). Hot winds increase crop evapotranspiration and therefore the rainfall (or irrigation) requirements of the trees increase. Where strong wind is frequent, windbreaks or shelter trees are to be recommended as both may improve crop performance.

As a general rule, if temperature is favourable, the growth of the arabica coffee tree shows a periodicity closely accompanying the rainfall distribution (Maestri and Barros, 1977; Rena et al., 1994). However, in some coffee zones resumption of active growth may precede the onset of rains, as occurs in south India (Mayne, 1944). According to Silva et al. (2004), declining air temperature appears to be the factor directly responsible for depressions in both growth and photosynthesis.

Although flowering is one of the most important physiological processes of the coffee tree (Barros et al., 1978), even at the beginning of this XXI century it is still a poorly understood phenomenon (Rena and Barros, 2004). Coffee flowering embraces a complex sequence of biochemical, physiological and morphological events which are affected by several factors such as temperature, light, soil and air water availability, carbon-to-nitrogen ratio, crop load and genotype (Rena and Barros, 2004). Flowers in arabica coffee open in the first hours of morning and pollination is known to occur in the forenoon (Alvim, 1985).

Several factors affect fruit set in coffee including both leaf (Rao and Setly, 1953; Phillips, 1970) and flower (Raju et al., 1975) number on the branch, carbohydrate supply (Cannell, 1971a) and flower atrophy (Huxley and Ismail, 1969). Apart from any effect of floral atrophy, fruits will not develop if a viable embryo sac is not formed, pollination does not occur or, after pollination, if the normal process of fertilisation is affected in any way (Huxley and Ismail, 1969). Fruit set is also affected by environmental factors such as heavy rains both during flower expansion (Huxley and Ismail, 1969) and at anthesis (Awatramani and Satyanarayana, 1973), mineral nutrition (Meza, 1981; Reis and Arruda, 1956), and sudden temperature drops (Meza, 1981). In addition to varying with species and cultivars (Srinivasan, 1972), fruit set also depends on the flower position on the plant (Reis and Arruda, 1956): the higher the branch position the greater the percentage of fruit set.

Three well defined periods of fruit drop have been described in arabica coffee (Barros et al., 1999), one occurring in the first four weeks, during the pinhead stage (pinhead drop), a second from the 5th to the 11th week during the endosperm filling stage (early drop), and the last after the 11th week of fruit growth.

## **VI. Findings and conclusions drawn:**

It is evident that the Coffee industry has occupied a prime place among the plantation crops in India and it is the only country where all the Coffee is shade grown. It is typically mild, not too acidic and possesses an exotic flavour and fine aroma. It is only in India that both the commercially important species viz., Arabica and Robusta are cultivated in equal proportions.

Indian Coffee industry is characterised by marked cultural dualism between subsistence oriented small growers and market oriented large and corporate producers. Small growers with less than 10ha land, account for 90% of the holdings covering 65% of land Coffee and contribute around 60% towards the country's production. Indian Coffee industry provides employment to lakhs of people in the plantations, besides providing indirect employment to thousands of people in processing and trade.

Still there are difficulties in production and marketing which are basically due to certain constraints such as lack of proper understanding of the regulations on organic agriculture, lack of inspection and certification arrangements at affordable rates and lack of adequate marketing arrangements for organic coffees at premium prices. With the introduction of "National Programme for Organic Production" proposed by the Ministry of Commerce & Industry, Govt. of India, the constraints pertaining to inspection and certification can be

overcome. However, there is a need for sustained efforts from all the concerned so as promote the concept of organic farming in coffee.

In India, Coffee is grown in acidic soil under varying climatic conditions. Under these conditions maintaining vigorous and healthy growth of Coffee bushes with tolerance to pests/diseases is possible only if sufficient and balanced nutrition is maintained. Fertiliser requirement of Coffee plants should be based on the amount of nutrients removed by the crop, the nutrient needed for the production of the necessary cropping, foliage, bush frame work and fertilizer use efficiency (FUE) in the plantation soils.

### **Scope for future research:**

Low or unpredictable yield per acre, low quantity of coffee production, inadequate storage and marketing facilities and labour are the major problems being faced by these growers. The over-all findings clearly revealed that there exists many differences in the methods of cultivation of Coffee in the traditional areas and that of in non-traditional areas. The farmers in the non-traditional areas are very backward with respect to their sociological and economic conditions. In addition to the requirements of increased productivity level, the socio-economic upliftment of farmers is also very much essential in these areas.

In order to develop need based technologies suitable for different agro-climatic conditions, Central Coffee Research Institute (CCRI) has been regularly involved in reorientation of research activities from time to time. Accordingly, the Institute has identified the following thrust areas of research to meet the future requirements of the coffee plantation industry:

1. Evolving leaf rust resistant varieties suitable for high density planting with high yields.
2. Standardization of sustainable production packages with emphasis on cost reduction, judicious management of vital inputs such as nutrients, water etc.
3. Standardizing package of practices for organic coffee as a specially manufactured coffee for the export market.
4. Integrated pest and disease management with emphasis on biological control, pheromone and other trapping techniques, so as to bring down reliance on hazardous pesticides.
5. Global warming poses a threat to future world coffee crops with rising temperatures and drought likely to force some producers to seek cooler land.
6. Integration of Indian Coffee trade with global trends

The high level market integration requires a much closer co-ordination between the producer, curer, and exporter for quality improvement.

Seller- buyer information exchange and interaction.

- Marketing and Government Policies
- Applied research on biotechnology (N-fixing Rhizobium strains), including genomics and genetic modification etc.,
- Improved technology for post-harvest systems (pulping, drying, hulling, storage, transportation and handling) including technology to protect against storage pests and diseases to improve coffee quality for world markets.

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