ORIGINAL RESEARCH PAPER

Arts

"Climate change: It's Impact on Coorg Coffee Production"

KEY WORDS: Green House Gases, Food Security, Diversification, Genetic Breed.

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ABSTRACT

Climate change is just one of numerous factors that may affect global coffee production; it is nonetheless likely to be one of the most important ones. It is true that a great degree of uncertainty still exists with regard to how individual producing regions will be affected, and how climate change will affect overall coffee production. However, experts expect some changes to occur, and these could be significant in some regions. This paper throws light on impact of climatic conditions on Coorg coffee production.

Objectives:

1. To know the status of coffee production in India
2. To discuss the impact of climatic conditions on production of Coorg coffee
3. Suggestion to use Genetic Seeds for adverse climatic condition

Method of study: The study was undertaken collecting information from Primary sources from DC Office, Madikeri, Agriculture office, Madikeri, Horticulture office, Madikeri, Coorg Coffee Board, Madikeri and secondary sources. Many journals, magazines, news papers and research articles have been consulted to prepare the paper.

Introduction:

Human beings depend for their livelihood on agriculture more than on any other economic activity. This is particularly true for small farmers in developing countries whose economic well-being and food security hinges primarily on farming. Because of this and its high dependence on climate, agriculture has received a great deal of attention promoting studies and debates over how developing countries might adapt to the impact of climate change. The subject is exceedingly complex, not only from the agricultural perspective but also because of its implications for the global agricultural and trade policies that impact agricultural production and food security.

While climate change is just one of numerous factors that may affect global coffee production, it is nonetheless likely to be one of the most important ones. It is true that a great degree of uncertainty still exists with regard to how individual producing regions will be affected, and how climate change will affect overall coffee production. However, experts expect some changes to occur, and these could be significant in some regions. To complicate matters further, the potential impact will not only vary between countries but also within producing areas in individual countries, for example due to different altitudes.

Global initiatives to reduce the emission of Greenhouse Gases (GHG) are expected to play an important role in the mitigation of climate change but this apart, better farming methods and improved technology throughout the value chain are of the utmost importance. It is here where the coffee sector is focusing increased attention as will be shown to the extent possible in the topic boxes that follow.

Climate change and its impact on coffee in Kodagu:

Coffee planters in the hill district of Kodagu in Karnataka are meticulous in keeping rainfall records in their estates. For some, the data goes back for decades. Their numbers tell the story of changing rainfall patterns, an indicator of climate change. The changing patterns also have an impact on the way they grow coffee, which has an effect on climate resilience in the hills and the plains. Due to the presence of this decentralised network of rainfall measuring stations, it is easier to obtain a nuanced picture of the precipitation trends for Kodagu, earlier known as Coorg, than in other parts of India. The average annual rainfall varies from above 5,000 mm in the western edge of the district to 1,200 mm in the east.

This data was used as part of the baseline survey by an international collaborative project to study the unique coffee agro-forestry system of Kodagu district. The College of Forestry at Ponnampet in Kodagu, as a participant in the Coffee Agro-forestry Network project, or CAFNET, has analysed the rainfall data of over 60 years from 116 coffee farms. "Keeping meticulous rainfall data is part of the culture we inherited from the British," said C.G.Kushalappa, University Head for Forestry and Environment Sciences at the College of Forestry. The CAFNET report noted that the length of the rainy season had decreased by 14 days over the past 35 years. It also noticed a strong fluctuation in annual rainfall with an apparent cycle of 12 to 14 years.

Table- 01
Category wise number of holdings in Kodagu:

Sl. No.	Particulars	No. of Holdings
1	Below 2 Ha	1442
2	2 to 4 Ha	580
3	4 to 10 Ha	484
4	10 to 25 Ha	11
5	25 Ha and above	3
	Total	**2520**

Low rainfall in coffee land:

Whether it is due to being the lowest point in this cycle or an El Nino changing rainfall patterns, 2015 and 2016 have been years of low rainfall in Kodagu. This is the second year of deficit rainfall in Kodagu. During 2015, it was deficient by 19%. As a result, the storage in the Krishna Raja Sagara dam reservoir, built across the Kaveri River immediately downstream of Kodagu district, has a 31% deficit this year. On the ground measurements by coffee grower K.K Naren in Kunda village near Ponnampet confirmed this. "Our normal rainfall is 90 to 100 inches (2,200 to 2,500 mm)," he said. "This year we have got 38 inches, whereas by this time we should have received 70% of the year's rain."

Coffee planters are confused by the erratic rainfall of recent years. "Rain and weather patterns have become increasingly unpredictable in recent years," said MB Ganapathy, head of plantations for Tata Coffee. "Even though the quantum does not seem to have changed, the rainfall is not well distributed any longer. There are long dry periods followed by heavy rain and high-velocity winds. This has made farm management difficult for us."

Table-02
Rainfall details in Kodagu

Sl. No.	Year	Rain fall (in mms)
1	2003	2090
2	2004	2678
3	2005	3509
4	2006	3374
5	2007	3448
6	2008	2413
7	2009	2912
8	2010	2647
9	2011	3077

10	2012	2001
11	2013	3229
12	2014	3016
13	2015	2500 (approximately)

Table no. 3
Production of commercial crops for previous five years

Year	Cardamom	Pepper	Cashew	Arecanut	Coffee
2011-12 (In tonnes)	443	3521	1354	4290	5792
2012-13 (in tonnes)	615	6038.7	2306	7806	6100
2013-14 (in tonnes)	500	4660	2962	4846	5200
2014-15(in tonnes	499.5	4560.1	2962	4815.8	4844
2015-16 (in tonnes)	635	5226.9	555	7861	Estimated for good crop

Table no. 4
Productivity of Coffee for previous five years

Sl. No.	Type of coffee	2010-11	2011-12	2012-13	2013-14	2014-15
1	Arabica	760	813	865	720	678
2	Robusta	1400	1400	1200	1600	1200

Coffee revenue helped Kodagu to become one of the richest districts in India. Coffea Arabica is also grown in some parts of Southern and Western Kodagu, the historical area of coffee production. One can go to see the coffee plantation and understand how sophisticated coffee plantation is how much perfection and precision it requires it is mandatory to grow coffee to grow coffee in shade so it is grown with the eucalyptus trees and the Vanilla. The coffee agro-forestry systems of Kodagu are one of the richest agro-forest in the world, with about 270 species of shaded trees inventoried. But the trend is now to replace the native shade trees by exotic ones. In those coffee agro-forests are also cultivated spices like black pepper, cardamom, vanilla. Besides that other famous agricultural produce of Kodagu Oranges known for its distinctive taste and shrunken nature. Kodagu is also known for its forest honey. Many other crops are also cultivated, including Para rubber, teak, and cocoa. There are also large areas of natural forest, especially in the forest in the south and east.

Climatic conditions:
Ideal climatic conditions to grow coffee are related to temperature and rainfall; temperatures in the range of 73 °F (23 °C) and 82 °F (28 °C) with rainfall incidence in the range of 60–80 inches (1.5–2.0 m) followed by a dry spell of 2–3 months suit the Arabica variety. Cold temperatures closer to freezing conditions are not suitable to grow coffee. Where the rainfall is less than 40 inches (1.0 m), providing irrigation facilities is essential. In the tropical region of the south Indian hills, these conditions prevail leading to coffee plantations flourishing in large numbers. Relative humidity for Arabica ranges 70–80% while for Robusta it ranges 80–90%.

Potential strategies to make coffee producers better prepared:
This would allow the mapping of areas prone to the spread of specific pests according to the likely impact of climate change. This would assist in determining which crops are best produced where and could help ensure that government guidance and assistance are correctly targeted. The United Nations Framework Convention on Climate Change (UNFCC) assists least developed countries to identify their immediate priorities for adaptation options. Over forty countries have received assistance to prepare their National Adaptation Programmes of action and many have already submitted their action plans. High temperatures mean coffee will ripen more quickly, leading to a fall in quality. This means areas currently favourable for coffee production may no longer be so in 20 years, and others currently too cold may become suitable. But this dislocation of existing areas to new ones is highly problematic, given the increasing competition for fertile land across all regions.
Devising strategies to diversify out of coffee where necessary. To date diversification has proven particularly challenging, mainly because of the lack of adequate substitute crops. However, with increasing pressure on food crops land currently used for coffee may become subject to competition from profitable crops. Evaluation available adaptation techniques, such as shade management systems, although originally a shade tree, coffee also prospers without shade in zones with adequate climate and soils. However, shade management is highly advisable when coffee is grown in less desirable areas, or in areas that will become affected by climate change. The main effects are decreasing air temperatures, decreasing wind speeds and increasing humidity. High density planting, vegetated soils and irrigation, all these aim at maintaining and increasing organic matter and soil water retention capacity, thereby enhancing the viability of cultivation under adverse climatic conditions.

Conclusion: Genetic breeding is the main objectives under this concept are the development of higher yields, better quality and strength, and longevity. However, it is equally important that genetic improvement based on selective breeding contributes to the long term sustainability of coffee cultivation in lands potentially affected by climatic change. Research on varieties that are less water demanding is equally important. Some research has focused on developing varieties that are less water demanding is equally important. Some research has focused on developing varieties that could cope with higher temperatures and remain highly productive at the same time.

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