The Major Factors Influencing Productivity of Coffee : A Study of Kodagu District in Karnataka

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Abstract

The research work was conducted to determine the emerging factors impacting productivity of coffee in Kodagu district, Karnataka. To achieve this, a survey was conducted in Kodagu from March to July 2016, covering 120 coffee growers from six coffee liaison zones. The regression coefficients of mean annual rainfall (inches), rainfall during critical period (inches), age of coffee trees (years), and area under coffee (ha) were found to be significantly positive, while the elevation (meters), white stem borer (number of plants uprooted per ha), and number of shade trees per hectare were found to be significantly negative. The study suggests Arabica cultivation at a higher elevation, rejuvenation of old coffee trees, conservation of more shade trees, and alternative irrigation during critical period could enhance productivity in the long run, while the development of pest resistance varieties, combined and coordinated research could effectively control white stem borer in Indian Arabica.

Keywords : **Productivity, factors, elevation, rainfall, shade, White Stem Borer, age**

JEL Classification : O0, P0, Q5

Paper Submission Date : December 3, 2016 ; Paper sent back for Revision : January 24, 2017 ; Paper Acceptance Date : April 10, 2017

Coffee occupies a significant position in the Indian economy. The country earned a revenue of Rs. 5179 crores through export of coffee during the financial year 2015-16. Besides, this sector provides direct employment to about 6.32 lakh persons, it also provides indirect employment to an equal number of people. India is the sixth largest producer of coffee in the world, contributing to 4.05% of global production. In India, coffee is cultivated in about 4.23 lakh hectares, of which Arabica is cultivated in 2.14 lakh hectares, and Robusta in 2.09 lakh hectares. The country produced about 3.27 lakh metric tonnes, out of which the major is Robusta coffee (70%), while the rest is Arabica production. The national average productivity was 847 kg/ha in 2014-15 (Coffee Board, 2016).

In India, about 98.80% of the land holdings are small-sized ones, with less than 10 hectares of land. In order to achieve economic sustainability of these small growers, productivity improvement from coffee farms remains crucial, especially in the current context of rising cost of production as higher returns can indirectly reduce cost of coffee production. Therefore, enhancing coffee productivity is the fastest way for coffee farms to attain economic sustainability besides improving quality of coffee in the long run, especially for small growers who produce the vast majority of the country's coffee.

Nevertheless, the productivity of coffee is influenced by several factors (elevation, rainfall, genetics, pests, diseases, and agronomic practices) either directly or indirectly. What are the emerging factors that enhance or

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limit the productivity of coffee in Kodagu and to what extent they impact the productivity is a key question. How can the 'limiting' or 'enhancing' factor be improved in order to realize higher profits is a key challenge. This paper attempts to find plausible answers to these questions. Besides, a study on individual factors impacting the productivity of coffee is essential to understand the productivity gaps existing in the region due to these factors. The study would also provide stakeholders with the necessary inputs to frame 'location specific policies' to enhance productivity and boost production as targeted by the Coffee Board of India.

Main Objectives and Methodology

This study attempts to understand the major factors influencing productivity of coffee in Kodagu district of Karnataka state. The study looks into seven major factors influencing productivity of coffee, that is, area under coffee (ha), elevation (meters), average annual rainfall (inches), rainfall during critical period (inches), age of coffee trees (years), incidence of White Stem Borer (uprooted plants per ha), and number of shade trees per hectare and analyzes their impact on productivity.

The survey employs both qualitative (in-depth interviews, extensive field observations, review of documents) and quantitative data collected in Kodagu for a period between March-July, 2016, through a comprehensive questionnaire, collected from 60 Arabica and 60 Robusta coffee growers. The survey respondents were identified through a multi-stage stratified random sampling method based on the latest official records of Coffee Board and Kodagu Planters' Association (CPA), Madikeri. At the first stage, three Arabica and three Robusta liaison zones were selected. At the second stage of sampling, two villages from each of these liaison zones were selected. At the third stage, 10 growers were randomly selected from each of these villages, classified as small (<10 ha) and large (>10 ha). The regression analysis was used to determine factors impacting productivity of coffee. Secondary data pertaining to the study were collected from publications of Indian Coffee Board and earlier literature in the area.

Major Findings

The socio-demographic characteristics of the sample households reveal that there was no marked difference with respect to household size among the Robusta and Arabica growers, the average household size being 4.86 members. The average number of earners were found to be more among the small (both Arabica and Robusta) growers, the average being 2.32 members. About 68.32% of the household heads belonged to age group 25-50 years, followed by 25.45% in the age group 50-75 years, while 6.23% were above 75 years of age. The coffee growers in Kodagu were found to be highly literate, about 54.02% being graduates, followed by pre-university educated (16.51%). About 57.95% belonged to the general category, followed by OBCs (35.94%), and minorities (6.11%) (Table 1).

The Table 2 provides the estate profile of the sample growers. About 89.35% of the estates were located at a lower elevation below 1000 meters, while only about 10.65% situated at an elevation of more than 1000 meters above the mean sea level. Rainfall of about 1 inch is required in the critical period (February-March). However, only about 5.05% of the estates received optimum rainfall during this period. The mean average annual rainfall in the surveyed estates revealed that about 62% of estates received low rainfall between 40-70 inches, 26.03% received medium rainfall (71-110 inches), and 7.90% of the estates received high rainfall (111-200 inches), while only about 4.07% of the estates received more than 200 inches of annual rainfall. Looking at the age of the coffee trees, about 28.05% of the estates comprised of coffee trees between 26 to 30 years of age, followed by 21% of estates between 15 to 20 years, 16.27% of estates between 21-25 years, 14.61% of estates between 36-40 years. It can be noted that about 10.92% of the estates had old coffee trees of more than 40 years of age. Taking into account the number of shade trees per hectare, about 39.65% of the estates had indigenous shade trees varying between 100 to 200 trees per hectare, while about 33.50% of the estates comprised of 200-300 shade trees per

Table 1. Socioeconomic Profile of the Sample Growers*

Background characteristics	ARABICA Small (n = 39)	ARABICA Large (n = 21)	ROBUSTA Small (n = 42)	ROBUSTA Large (n = 18)	AVERAGE
Household size (numbers)	6.04	3.84	5.57	4.00	4.86
Average earners (numbers)	2.74	1.81	2.62	2.12	2.32
Age group of household head (%)					
>25 years - ≤ 50 years	58.99	57.15	73.80	83.33	68.32
>50 years - ≤ 75 years	35.89	28.57	26.20	11.12	25.45
> 75 years	5.12	14.28	0.00	5.55	6.23
Education status of growers (%)					
1= Illiterate	0.00	0.00	0.00	0.00	0.00
2= Lower primary	7.86	0.00	0.00	0.00	1.97
3= Upper primary	18.75	0.00	6.25	0.00	6.25
4= High school	23.58	6.25	15.44	16.66	15.49
5= Pre-university	12.70	17.78	27.20	8.33	16.51
6= Graduate	33.87	75.96	43.75	62.50	54.02
7 = Post graduate	3.22	0.00	7.35	12.50	5.77
Caste of households (%)					
SC	0.00	0.00	0.00	0.00	0.00
ST	0.00	0.00	0.00	0.00	0.00
OBC	69.76	7.69	62.13	4.16	35.94
General	28.62	82.21	33.45	87.50	57.95
Minorities	1.61	10.09	4.41	8.33	6.11

Note: *All figures under each background characteristics are percentage of the total number of sample growers.

hectare, 22% of the estates with less than 100 shade trees, and only 4.85% of the estates comprised of more than 300 shade trees per hectare.

The value of R square is found to be 0.74 (Table 3), indicating that 74% of the variation in productivity is explained by the independent variables included in the equation. The regression coefficients of rainfall (inches), rainfall during critical period (inches), and age of coffee trees (years) are significantly positive. This reveals that an increase in the above mentioned variables has a positive impact on the yield. However, the regression coefficients of elevation (meters), white stem borer (number of plants uprooted per hectare), and number of shade trees per hectare are negative. This reveals that an increase in these variables decreases the productivity of coffee.

An inverse relation between farm size and productivity in agriculture is well established in the empirical literature. On contrary, our study reveals that productivity of coffee increases with farm size. By and large, the relationship between farm size (area under coffee) and productivity is found to be positive. Our study reveals that large growers tend to produce more per unit area than the small growers. There are several reasons for that. First of all, coffee production is a labor intensive process. Practically, only the large growers are financially efficient enough to employ permanent laborers. However, given the financial constraints, the small growers sparingly engage only the casual laborers who are usually unskilled. The small and marginal growers at times of income constraint can also limit certain farm activities which could have an adverse impact on productivity (Upendranath & Subbaiah, 2010). Large growers along with permanent as well as casual laborers are able to carry out timely operations required by the estates. Secondly, coffee is grown with a number of intercrops, especially pepper and

Table 2. Estate Profile of the Sample Growers*

Estate Profile	ARABICA Small (n = 39)	ARABICA Large (n = 21)	ROBUSTA Small (n = 42)	ROBUSTA Large (n = 18)	Average
Elevation (meters)					
<1000 meters	84.07	86.06	95.59	91.67	89.35
>1000 meters	15.93	13.94	4.41	8.33	10.65
Annual rainfall (inches) during reference year 2015-16					
Low rainfall (40-70 inches)	71.25	86.05	32.35	58.33	62.00
Medium Rainfall (71-110 inches)	23.75	13.95	33.08	33.35	26.03
High Rainfall (111-200 inches)	5.00	0.00	22.43	4.16	7.90
Very High Rainfall (>200 inches)	0.00	0.00	12.14	4.16	4.07
Rainfall (inches) during critical period (2015-16)					
0 inches	52.74	52.50	8.80	16.66	32.68
0.1 -0.5 inches	15.07	17.50	78.70	66.67	44.48
0.5-1 inches	25.74	22.50	6.25	16.67	17.79
1-2 inches	6.45	7.50	6.25	0.00	5.05
Age of coffee trees (Yrs)					
15-20 yrs	29.28	8.33	26.01	20.83	21.11
21-25 yrs	29.28	22.22	5.27	8.33	16.27
26-30 yrs	18.09	44.45	37.16	12.5	28.05
31-35 yrs	11.84	5.55	4.20	14.58	9.04
36-40 yrs	10.19	13.89	26.02	8.33	14.61
>40 yrs	1.32	5.56	1.35	35.43	10.92
Number of shade trees /ha					
<100 trees/ha	10.25	9.52	40.47	27.77	22.00
100-200 trees/ha	30.76	19.05	47.63	61.12	39.65
200-300 trees/ha	53.84	57.15	11.90	11.11	33.50
>300 trees/ha	5.15	14.28	0.00	0.00	4.85

Note : *All figures under each estate profile are percentage of the total number of sample estates.

Table 3. Factors Impacting Productivity of Coffee: A Regression Analysis

Variables(1)	Cobb-Douglas Coefficient (2)	t - Stat	p - value
Constant	13.62423 (2.80)	4.862437***	3.81E-06
Area under coffee (ha)	0.037526 (0.02)	1.272118	0.205966
Elevation (meters)	-1.34374 (0.35)	-3.73954 ***	0.000292
Average annual rainfall (inches)	0.177229 (0.07)	2.40026**	0.018032
Rainfall during critical period (inches)	0.213024 (0.09)	2.273644**	0.024894
Age of coffee trees (yrs)	0.256574 (0.10)	2.383168**	0.018848
White stem borer (Uprooted plants/ha)	-0.47845 (0.04)	-9.59964***	2.77E-16
Shade (number of shade trees/ha)	-0.31019 (0.07)	-4.27209***	4.08E-05
R-Square = 0.749	F ratio = 47.85***		

*** and ** significant at the 0.01 and 0.05 level, respectively. Figures in parentheses are the standard errors.

areca. The small growers, during period of price crashes, shift to other intercrops, and invest on those crops, especially pepper instead of coffee (Patel, 2016). Thereby, coffee estates of small growers remain neglected, which adversely impact the following year's productivity. Further, Robusta coffee requires certain amount of precipitation (about one inch of rains) during the critical period of February-March for blossoming, flower, and fruit setting. When the rains fail during this period, an alternative is to irrigate coffee crops through sprinkler irrigation. The small growers at times do not provide optimum irrigation at the 'right time', which can result in lower productivity.

Elevation has a profound impact on both productivity and quality of coffee. In forest plantations, higher elevations are characterized by lower productivity (Mayhead, 1973). Similarly, in our studies, the diminishing rates of productivity due to increasing elevation have been observed. For every 1% increase in elevation, the yield reduces by 1.34% (Table 3). The high elevation zones in Kodagu were earlier cardamom growing belts. But after the outbreak of mosaic virus (Katte disease) in cardamom, causing huge loss, the growers were forced to convert a large percentage of cardamom land to coffee and are still struggling with coffee as this converted land was found to be less suitable for coffee cultivation (Deepika & Jyotishi, 2013). The Arabica coffee grows best at a higher altitude, while Robusta prefers lower ones. Henceforth, it is advisable to cultivate Arabica variety of coffee instead of Robusta. There is also perception among the growers that at a higher elevation, coffee should be replaced by tea.

Looking into the mean average annual rainfall (inches) received by individual coffee estates during the reference year 2015-16, it is found that for every 1% increase in rainfall, the productivity of coffee increased by 0.17%. Thus, a positive relation is observed between rainfall and productivity of coffee. Likewise, Haggar and Schepp (2011) noted that higher rainfall increases productivity of coffee. Besides, timing of rainfall is also a major factor determining productivity of coffee. The rainfall of one inch during the critical period of January and February is the most crucial for blossoms and fruit setting, and is considered a major factor that determines yield. If the rains fail during these months, the growers need to irrigate their estates using artificial sprinkler irrigation. It can be noted from the Table 2 that only about 5.05% of the growers received rainfall during the critical period (reference year 2015-16), other growers had to substitute it with artificial sprinkler irrigation. However, the small growers in Kodagu are not able to use sprinkler irrigation facilities due to financial constraints, which can also hamper the following year's productivity (Deepika & Jyotishi, 2013). It can be seen from the Table that 1% increase in rainfall during critical period can increase yield by 0.21% (Table 3).

Coffee is a perennial crop. The average economic bearing period of coffee tree is 30-40 years, though some plantations bear up to 100 years. After planting, the initial four years of gestation period is the establishment period. The coffee shrubs start bearing only after 3-4 years after planting. To obtain economic returns, it takes about 8 years for Arabica and 10-12 years of Robusta under good management practices like pruning, irrigation, shade regulation, fertilization, pest, and disease management. It is seen from the Table 3 that for every 1% increase in the age of coffee trees, the productivity of coffee increases by 0.25% (Table 3). But as the economic bearing period of coffee trees is less than 40 years, rejuvenation of aged coffee trees above 40 years is required, since about 10.92% of surveyed estates comprised of coffee trees having already crossed the economic bearing age.

Currently, white stem borer (WSB) is a major pest, ranked as the number one and a major production constraint in Arabica variety of coffee. The WSB bores into the coffee plant, resulting in subsequent uprooting of the plant. The average uprooting of Arabica plants per hectare was found to be 150 plants per hectare in individual estates. Our study reveals that for every 1% increase in uprooting of coffee plants due to white stem borer (WSB), the yield reduced by 0.47% (Table 3). Interestingly, the incidences of WSB were severe in estates located at lower elevations and in lower rainfall belt (Table 4). Among the environmental factors responsible for borer attack, the growers ranked rise in temperature as the number one cause for WSB attack, followed by erratic rainfall, and lower elevation (Figure 1). While among the management factors, the growers ranked flight of WSB from

Table 4. Impact of Elevation and Rainfall on Incidence of White Stem Borer

	Number of Estates[4]					
WSB Incidence	**LE+LR[1]**	**LE+MR[2]**	**LE+HR[3]**	**HE+LR[4]**	**HE+MR[5]**	**HE+HR[6]**
Low (<10 uproot plants/ac)	4 (7.00)	-	-	1 (2.00)	-	-
Medium (10-25 uproot plants/ac)	8 (13.00)	3 (5.00)	2 (3.00)	2 (3.00)	-	-
High (25-50 uproot plants/ac)	11 (18.00)	7 (12.00)	1 (2.00)	1 (2.00)	1 (2.00)	-
Very High (50-100 uproot plants/ac)	12 (20.00)	2 (3.00)	-	0 (0.00)	1 (2.00)	-
Critical (100-150 uproot plants/ac)	-	-	-	-	-	-
Alarming (>150 uproot plants/acre)	1 (2.00)	1 (2.00)	-	-	-	-
Total estates	36 (60.00)	13 (22.00)	3 (5.00)	6 (10.00)	2 (3.00)	-

Note : Figures in parentheses indicate percentage of estates.

[1] LE (Low Elevation) + LR (Low Rainfall) under <1000 meters elevation & Mean Annual Rainfall of 40-70 inches.

[2] LE(Low Elevation)+MR (Medium Rainfall) under <1000 meters elevation & Mean Annual Rainfall of 71-110 inches.

[3] LE(Low Elevation) + HR (High Rainfall) under <1000 meters elevation & Mean Annual Rainfall of 111-200 inches.

[4] HE (High Elevation) + LR(Low Rainfall) under >1000 meters elevation & Mean Annual Rainfall of 40-70 inches .

[5] HE(High Elevation) + MR (Medium Rainfall) under >1000 meters & Mean Annual Rainfall of 70-110 inches.

[6] HE (High Elevation) + HR (High Rainfall) under >1000 meters & Mean Annual Rainfall of 110-200 inches .

Figure 1. Environmental Factors Responsible for WSB Attack

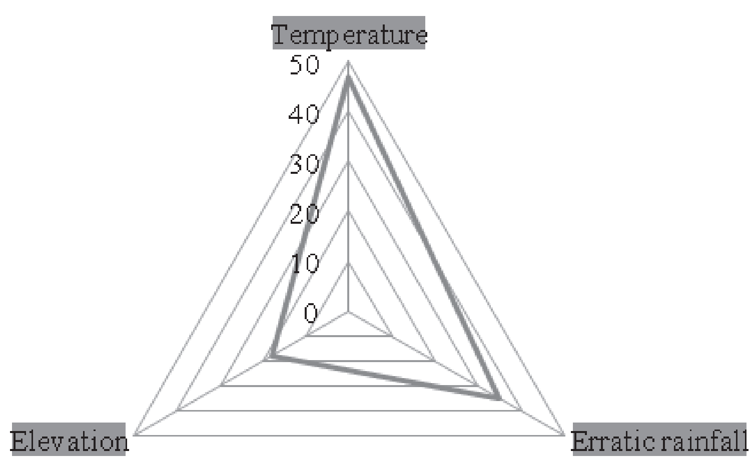
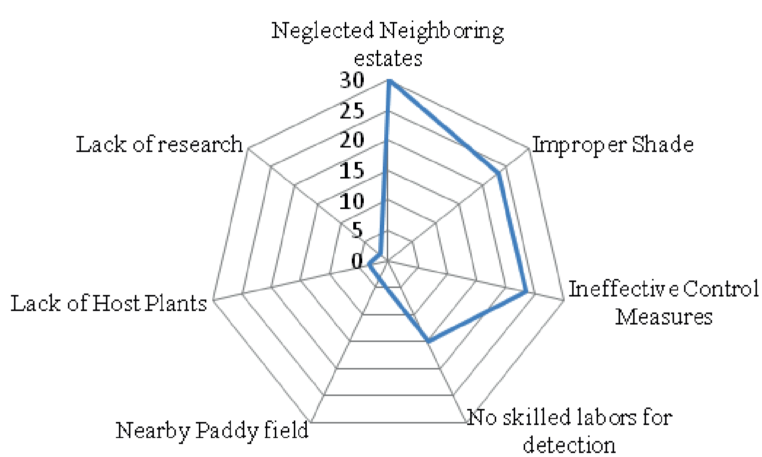


Figure 2. Management Factors Responsible for WSB Attack



neglected neighboring estates, followed by improper shade and ineffective control measures as major three factors responsible for borer attacks (Figure 2).

As mentioned earlier, shade management can impact white stem borer in Arabica. Besides, shade can also impact productivity of both varieties of coffee. The specialty of Indian coffee is that it is grown under shade, unlike in other countries, where it is grown under sun. The surveyed estates comprised of shade trees in two or three-tier shade canopies. It is found that shade is inversely proportional to productivity. For every 1% increase in shade, yield reduced by 0.31%. However, Bote and Struik (2011) noted that though productivity of coffee is low under shade, the coffee trees produced heavier and better quality beans. Besides, the shade trees also reduced the periodic over-bearing and subsequent die-back symptoms of coffee trees, thereby maintaining the coffee productivity in the long run (Muschler, 2001). The studies also revealed that though shade reduces productivity of coffee, it effectively controls white stem borer, thereby indirectly maintaining Arabica productivity (Venkatesha, 1999). It was observed during the survey that in-order to obtain faster and higher yield, growers remove shade trees and expose their plants to direct sunlight. This can adversely impact coffee cultivation in the long run. Firstly, reduction in shade can encourage more pest-outbreaks into the estates (currently, WSB in Arabica). Secondly, the reduction of shade trees in coffee estates can adversely impact rainfall patterns in Kodagu in the following years.

Conclusions and Recommendations

The socio-demographic characteristics of the sample households reveal that apart from the size of land holdings and percentage of earners, there was no marked difference between Arabica and Robusta households. Majority of the sample growers belonged to the age group 25-50 years, while literacy percentage was found to be higher among the coffee growers in Kodagu. Majority of the growers belonged to the general caste and OBCs, followed by minorities.

The estates profile revealed that majority of estates (both Arabica and Robusta) were located at an elevation below 1000 meters and medium rainfall belt (71-110 inches). Only a meager number of growers received rainfall during the critical period, others had to substitute with sprinkler irrigation. However, not all the growers owned sprinkler sets, and either had to rent machine or forego timely irrigation activity. Therefore, the concerned authority should provide such essentials to the growers at the right time, especially to the marginal growers.

Though the average economic bearing period of coffee trees was about 30 - 40 years, about 3.33% of Arabica and 11.66% of Robusta estates comprised of coffee trees more than 40 years. Thereby, rejuvenation of estates by removing old trees in small quantities and replanting with the new ones can also boost productivity. Besides, the presence of shade trees can enrich the coffee estates besides providing numerous ecological benefits including control of deadly pests in coffee. Thereby, conservation of shade trees can provide long run benefit to the growers.

Among the factors adversely impacting productivity of coffee, WSB in Arabica was ranked as number one factor, resulting in heavy revenue losses to the growers to the extent that the Arabica growers were shifting towards Robusta. The available management recommendations for white stem borer are found to be highly ineffective. At the research end, there is still lack of proper output for the effective control of this pest. The bio-control measures for this control are yet to be fully exploited. Therefore, development of pest resistant variety is the need of the hour. Lastly, timely management practices can certainly enhance the productivity of coffee in Kodagu.

Research and Policy Implications

Our study reveals that higher elevation was associated with lower productivity. However, the Coffee Board recommends higher elevation suitable for Arabica cultivation (600 to 2000 meters above mean sea level).

Thereby, growers cultivating Robusta at higher elevation can be encouraged to cultivate Arabica in higher altitudes as Arabica thrives best at higher altitude and lower temperature. Thereby, the Coffee Board could take up initiatives to rejuvenate aged Robusta estates (above 40 years), situated at higher elevation and replace Robusta with Arabica variety of coffee.

It was observed from our survey that about 10.92% of the estates crossed the economic bearing age (> 40 years), leading to decline in productivity and quality. Therefore, the government should play the role of catalyst towards acceleration of coffee productivity in extending financial support to the needy growers for undertaking replanting and rejuvenation of old coffee trees and replacement by younger ones in a phased manner.

Besides, WSB is currently a major pest of Indian Arabica, resulting in huge economic losses to the growers, who are shifting towards Robusta. Though several research studies have been carried out in isolation by different countries, no effective solution has been provided to the coffee growers, thereby inter-countries combined research on WSB is the need of the hour. Besides, the varietal and bio-control measures are yet to be fully exploited. Apart from these, efforts should be directed towards creating awareness by promoting lab-field technology transfer.

Limitations of the Study and Scope for Further Research

The study took into account only seven major factors impacting productivity of coffee. While there are also other factors (fertilizer application, pruning, irrigation, genetics) that impact productivity of coffee directly or indirectly, they are yet to be explored. The research was conducted at only one major coffee growing region of Karnataka. While there are other major coffee growing regions in India which differ from this region in terms of agro-ecological patterns, varieties of coffee are cultivated and cultural practices are followed. The study was confined to Kodagu district in Karnataka state taking into account seven major factors impacting productivity.

Likewise, a similar study can also be conducted in the future for comparing factors responsible for productivity differences in two or more coffee growing regions or states of India. Besides, other factors like impact of agronomic factors (fertilizers, irrigation, pruning, weeding) on productivity of coffee can be studied. By doing so, most 'enhancing' or 'limiting' factors that influence productivity of coffee can be obtained.

References

Coffee Board of India. (2016). *Database on coffee*. Retrieved from www.indiacoffee.org

Bote, A. D., & Struik, P. C. (2011). Effects of shade on growth, production and quality of coffee (Coffea Arabica) in Ethiopia. *Journal of Horticulture and Forestry, 3* (11), 336 - 341.

Deepika, M. G., & Jyotishi, A. (2013). *Assessing risk and risk mitigation strategies of small coffee growers: A study of Kodagu district in Karnataka* (Discussion Paper No. 21). Thiruvanathapuram: NRPPD, Centre for Development Studies.

Haggar, J., & Schepp, K. (2011). *Coffee and climate change. Desk study: Impacts of climate change in four pilot countries of the coffee and climate initiative.* Retrieved from http://www.coffeeandclimate.org/tl_files/Themes/CoffeeAndClimate/Country%20profiles/Report%20Coffee%20Climate_Pilot%20Guatemala_Haggar%20Schepp.pdf

Mayhead, G. J. (1973). The effect of altitude above sea level on the yield class of Sitka spruce. *Scottish Forestry, 27*(3), 231- 237.

Muschler, R. (2001). Shade improves coffee quality in a sub-optimal coffee zone of Costa Rica. *Agroforestry Systems, 85,* 131 - 139.

Patel, A. (2016). *Coffee plantations in Kerala, India.* Retrieved from http://indiamicrofinance.com/coffee-plantations-kerala-india.html

Upendranath, C., & Subbaiah, C. A. (2010). *Coffee conundrum: Whether the future of small growers in India* (Discussion Paper 3). Thiruvananthapuram: NRPPD, CDS.

Venkatesha, M. G. (1999). Why is white stem borer persistently a serious pest in Arabica coffee plantations? *Indian Coffee : Bulletin of the Indian Coffee Board, 63*, 11 -14.

ARTHSHASTRA INDIAN JOURNAL OF ECONOMICS & RESEARCH

Statement about ownership and other particulars about the newspaper "Arthshastra Indian Journal of Economics & Research" to be published in the 2nd issue every year after the last day of February.

FORM 1V
(see Rule 18)

1.	**Place of Publication**	**:**	**NEW DELHI**
2.	**Periodicity of Publication**	**:**	**BI- MONTHLY**
3.	**4,5 Printer, Publisher and Editor's Name**	**:**	**S. GILANI**
4.	**Nationality**	**:**	**INDIAN**
5.	**Address**	**:**	**Y-21,HAUZ KHAS, NEW DELHI - 16**
6.	**Newspaper and Address of individual**	**:**	**ASSOCIATED MANAGEMENT**
	Who owns the newspaper and partner of	**:**	**CONSULTANTS PRIVATE LIMITED**
	Shareholder holding more than one percent.	**:**	**Y-21, HAUZ KHAS, NEW DELHI-16**

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