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ECONOMICS OF ORGANIC COFFEE AND PEPPER CULTIVATION IN KERALA

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Abstract

The present study was carried out to assess the economics of organic farming in Kerala based on primary data from 724 organic farmers from the Idukki and Wayanad districts of Kerala. It compares the profitability, productivity, and cost-effectiveness of pepper and coffee among conventional and organic farmers in Kerala. There are substantial differences between organic and conventional farmers and between various land sizes in the yield of coffee and pepper. The average productivity of coffee per acre on organic farms is 736 kg, and of pepper, it is 372 kg. While non-organic farm output per acre of coffee and pepper is 923kg and 529kg, respectively, the cost of cultivation per acre is greater in the case of conventional farms when compared to organic farms. Organic farms are more economical than conventional farms. The profit per acre is greater in the case of non-organic farms when compared to organic farms.

Keywords: Organic farming, conventional, productivity, economical, profitability

1. INTRODUCTION

Agriculture is one of the most basic economic activities of the people in a country. The significance of agriculture to the economy and society varies depending on factors, including its impact on employment and the gross domestic product at the national and regional levels. Moreover, in developed countries 'sustainability' issues in agriculture have become blended with major concerns over food health and food quality; whereas in developing countries, poverty and population pressure are important considerations (Ian Bowler 2002).

Around 3.1 million farmers cultivated 72.3 million hectares of land organically in 187 countries (FAO 2021). Organic farming is practiced in 1.1 percent of the world's agricultural area. There are 2.4 million organic farmers worldwide, with India having the most farmers (585,200 More than 106 billion euros were spent on organic food and drink globally in 2019. The world organic market has increased to 81.6 billion U.S. dollars in 2015 from 17.9 billion in 2000 (FiBL 2016). Organic farming in India has grown at a steady pace after the implementation of the National Program for Organic Production (NPOP) in 2001 by the Ministry of Commerce and Industry. India is ranked first in the world for the total number of producers and ninth for the amount of organic agricultural land (FIBL & IFOAM Year Book, 2020). In total, 5.71 million hectares are certified as organic (2015-16). This includes 26% of the arable land (1.49 million hectares) and 74% of the forest and wildland (4.22 million hectares) for minor forest product collection. In India, 4339184.93 hectares (registered under the National Programme for Organic Production)

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will be subject to the organic certification process overall in 2020–21.

Kerala is one of the pioneering states in India that has made endeavour on the road to organic movement at the government level. The state Department of Agriculture gave promotion to organic farming by constituting an autonomous cell for the promotion of sustainable agriculture and organic farming in 2002-03. There is a substantial prospective for stimulating organic farming in Kerala. When the national average consumption of fertilisers and pesticides during 2002-2003 was 90 kg/ha and 288 g/ha, respectively, in Kerala it was only 60 kg/ha and 224g/ha. The average use of major chemical fertilisers at the national level was 135.76 kg/ha in 2015-16, which came down to 123.41 kg/ha in 2016-17. The consumption of fertilizers has steadily increased to 133.44 kg/ha in 2019-20 at the national level. The consumption of chemical pesticides has also been increasing in India. There has been an 8.78% growth in the overall use of pesticides in the country from 56,720 metric tonnes (MT) to 61,702 MT between 2015-16 and 2019-20, But Kerala outline a fall from 87 kg/ha in 2015-16 to 36.49 kg/ha in 2019-20 (Rajya Sabha, February 2021). This is the hopeful prospect of agriculture in Kerala in terms of the already lower use of hazardous chemicals and, therefore, auspiciously offsetting farmers to organic agriculture are quite high. Kerala has an accredited organic certification agency to assist with the requirements of the farmers. Non-governmental organizations (NGOs) were instrumental in spreading organic farming throughout the state. Wayanad and Idukki districts in Kerala have occupied the first two places in the certified organic agriculture area. These two districts come across the Cardamom Hills of the Western Ghats and the domicile of various renowned spices and beverage crops production and export to different European countries and the USA.

The majority of the population in Kerala depends on agriculture and it produces 96% of the national pepper production in India. Kerala is second with 21% in coffee production. Agriculture supports the livelihood and economic prosperity of Kerala. The agricultural sector in Kerala faces several challenges and limitations when it comes to meeting the requirements of its increasing population. Unscientific use of agrochemicals, particularly pesticides, not only generates nutritionally poor food products but also results in health hazards to humans and the environment. It is estimated that approximately 85 percent of pesticides used in agriculture are consumed fresh, posing direct threats to public health. Farmers are fetching more reliant on external inputs, mainly for agrochemicals. Furthermore, even in rural areas, the water quality is collapsing and environmental health problems are advancing. From this perspective, organic farming that augments soil productivity by keeping soil biologically alive is the only substitute for food security and sustainability. The economics of location-and crop-specific characteristics of organic farming in Kerala has not yet been studied by any scholar. Kerala has the capability of conducting organic management of agricultural production. Consequently, it is deemed important to conduct a thorough study comparing the economics of conventional versus organic farming across a variety of crops. The current study aimed to close this gap by contrasting the economics of conventional and organic farming in Kerala for the two primary crops, coffee, and pepper. In these circumstances, a comparison of the economics of organic and conventional farming can provide some light on Kerala's organic agricultural sector.

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2. METHODOLOGY

The study was both descriptive and analytic since it aimed to describe the economics of organic agriculture in the context of Kerala. This research design is essential to bring about a data archive sufficient to answer six research questions proposed by the study:

The study tries to answer the following research question.

1. Is organic agriculture economically feasible?
2. Is organic farming more cost-effective than conventional farming?
3. Is there a significant distinction in productivity between organic and non-organic farming?
4. Is organic farming more profitable than conventional farming?

The objective of the study was to examine the productivity, cost-effectiveness, and profitability of organic farming.

The following hypotheses are considered in the study.

1. There is a significant difference in productivity between organic and conventional (non-organic) farms.
2. The cost of production varies significantly among organic and conventional farms.
3. There is a significant difference in profit between organic and non-organic farms.

The present study used microeconomic analysis to find out the economics of organic farming in Kerala. The concepts of production, cost, and profitability are used to analyze the economics of organic farming. The study hypothesizes that organic farming practices are used in the production function of agriculture and then studies the effects of them on yields of specific crops and costs between organic and non-organic farming. Thus, a microeconomic analysis is used to examine how organic farming in various parts of Wayanad and Idukki affects agriculture.

2.1 Sampling design

This study consists of primary data gathered from farmers in Wayanad and Idukki districts. The study examined the economic and environmental aspects of organic and inorganic farming systems in the study area. Presently, 22104.5 hectares of land have been cultivated by farmers through organic farming in Kerala. There are 31,913 certified organic farmers by certification agencies in Kerala. Wayanad Social Service Society (WSSS), based in Wayanad, is one of the NGOs in the state that promotes organic farming. 34.2% of the total area of the state is under organic farming. The total number of farmers certified in organic farming in Wayanad district was 12,074 till December 2021. The major crops in these districts are coffee and pepper; therefore, farmers have been chosen elicited from the proportion of area under organic farming. The sampling was carried out by following certain criteria: a) Farmers with at least three years of organic farming experience were considered for the study. b) A household head was selected

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for the interview because he had good knowledge of the costs and benefits of organic farming.

A sample size of 724 was collected from organic farmers and 200 conventional farmers from Wayanad and Idukki districts of Kerala. The sample households were preferred by using a multi-stage stratified random sampling technique. The reference year of the study is 2011–21. The study has used the questionnaire and interview method for the primary data collection from the farmers who cultivate their land using organic and inorganic farming methods in the study area. A pre-tested schedule is used to gather information from the selected farmers on the cost of farming, output, profit etc. Further, the researcher has also employed the participant observation method to collect the data. In an exploratory case study, interviews are the primary means of data collection (Creswell, 2008). Interviews are valuable in exploring the participants' thoughts and experiences as well as their behavioural patterns (Tellis, 1997). Data collection consisted of a well-structured interview schedule was used to gather information from the respondents with open-ended questions, which resulted in pertinent information regarding the participants' thoughts and experiences (Miles, M.B., Huberman, A.M. and Saldana, J. (2014). The study used two types of questionnaires for farmers in organic and non-organic farming.

Microsoft Office Excel 2013 and the Statistical Package for Social Science (18.0th Version) are used to process and interpret the data effectively. Regression analysis is used to measure the variation in the total cost of production between farms. The standard deviation demonstrates absolute variability, as well as the coefficient of Variance, shows relative variability is used for the analysis. Cross tabulation, the Chi-square test, ANOVA, the two-sample t-test, the F test, and the Z test are used in the analysis of data.

3. RESULTS AND DISCUSSION

Statistical Analysis of Per Acre Output of Coffee and Pepper

The difference between productivity in various classes of farms and types is given in Table 1. There is a significant difference in the productivity of coffee and pepper within different land sizes in organic farming. Among organic farmers, medium-sized farms are more productive in the production of coffee than small and large farms. In the productivity of pepper, medium-sized farms also have more output among organic farmers. The average productivity of coffee per acre on organic farms is 736 kg, and of pepper, it is 372 kg. While non-organic farm output per acre of coffee and pepper is 923 kg and 529 kg respectively.

In the case of non-organic farming, the large farm is more productive than the medium and small farms, while small farms are more productive than medium and large farms in the production of pepper. There are significant differences between organic and non-organic farmers and between various land sizes in the production of coffee and pepper.

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Table 1: Comparison of output between farms

Type of farm	Class of farm		Coffee Output per Acre in Kg.	Pepper Output per Acre in Kg.	Total Cost Coffee ₹	Total Cost Pepper ₹
Organic	Small	Mean	740.878	365.675	13097.3006	11126.4417
		Number	326	326	326	326
		Std. Deviation	296.1690	133.5630	7799.54312	8069.35413
	Medium	Mean	712.328	362.412	25217.0543	21051.1628
		Number	258	258	258	258
		Std. Deviation	144.9427	109.0848	12553.16895	9095.94790
	Large	Mean	768.766	408.955	65548.5714	41548.5714
		Number	140	140	140	140
		Std. Deviation	140.9134	121.0328	51726.38926	31937.52390
	Total	Mean	736.097	372.881	27558.7293	20545.8840
		Number	724	724	724	724
		Std. Deviation	225.8900	123.8525	31157.94630	19473.13790
Non-organic	Small	Mean	853.599	572.275	28214.2857	18207.1429
		Number	56	56	56	56
		Std. Deviation	272.2277	259.2775	29728.07161	12693.51526
	Medium	Mean	862.709	507.511	36766.6667	26806.6667
		Number	60	60	60	60
		Std. Deviation	269.3419	198.3719	22633.65593	16053.63629
	Large	Mean	1014.129	517.157	78080.9524	55266.6667
		Number	84	84	84	84
		Std. Deviation	138.0938	200.9568	40701.42036	35697.73569
	Total	Mean	923.754	529.696	51724.0000	36352.0000
		Number	200	200	200	200
		Std. Deviation	232.8508	215.1687	39763.35899	30196.06840

Source: Primary data.

There are significant differences between organic and non-organic farmers and between various land sizes in the yield of coffee and pepper. There is a significant difference in the productivity of coffee and pepper within different land sizes in organic farming in Kerala. Medium-sized farms are more productive in the production of coffee than small and large farms of organic farmers. In the productivity of pepper, medium farms also have more output than organic farmers.

The cost of cultivation per acre is greater in the case of non-organic farms when compared with organic farms. The cost of production of both pepper and coffee is lower for organic farmers. It is Rs. 6580 for coffee and Rs. 5978 for pepper in Kerala. In the case of non-organic farmers,

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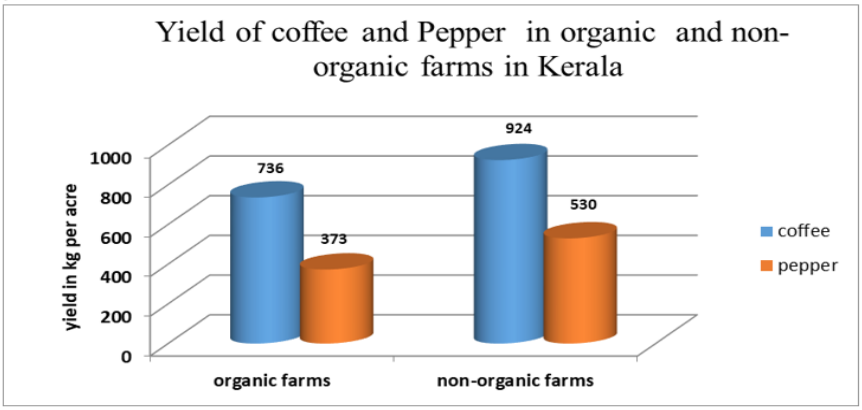
the cost of coffee production is Rs 13455 and for pepper, it is Rs 8391. Organic farming is more cost-effective when compared to non-organic farming. The same finding was given by Gunjal (1990), Peterson (1999), John et al. (2001), Sharma (2004), Narayana (2005), Guruswamy and Balaganga (2010), and Chandrasekar (2010).



.Figure 1: Yield of pepper and coffee among farms

Table 2: Cost difference in organic and non-organic farms

Category	Number	Mean	S.D	Value of t statistic	d.f	Significance
Organic	724	15198	8331.1			
Non-organic	200	21392	14533.8	4.418	410	< 0.001

Source: Primary data.

The value of the t statistic, namely 4.418, is significant at a 5% level, and hence we reject the null hypothesis. That is, the cost of cultivation per acre is greater in the case of non-organic farms when compared to organic farms. Organic farming is more cost-effective when compared to non-organic farming.

Table 3: Comparison of Coffee output between Idukki and Wayanad

Districts	Number of farmers	Mean	Std. Deviation
Idukki	362	733.374	102.0003
Wayanad	362	762.637	275.7837
Total	724	736.097	225.8900

Source: Primary data

There are slight variations in per acre output of coffee among Idukki and Wayanad. The variations in output are due to the age of the coffee plant, cropping pattern, and geographical and climatic features.

Table 4: ANOVA

Particulars	Sum of Squares	df	Mean Square	F-value	Sig.
Between Districts	111210.405	6	37070.135	0.725	0.538
Within District	18309284.001	718	51143.251		
Total	18420494.406	724			

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Source: Primary data

The value of the F statistic, namely 0.725, is not significant at the 5% level; hence, we accept the null hypothesis. Coffee yield per acre of organic farms does not differ among districts.

Table 5: Per acre Yield of pepper in Idukki and Wayanad

District	Number	Mean	Std. Deviation
Idukki	362	371.458	118.7352
Wayanad	362	393.496	136.6921
Total	724	372.881	123.8525

Source: Primary data

There are slight variations in per acre output of pepper among farmers in Idukki and Wayanad. The variations in output are due to the age and variety of the pepper plant, cropping pattern, and geographical and climatic features.

Statistical tool ANOVA is used to test the hypothesis of whether yield per acre of pepper in organic farms differs among districts.

Table 6: ANOVA

Particulars	Sum of Squares	Df	Mean Square	F-value	Sig.
Between districts	40191.975	6	13397.325	0.872	**0.455**
Within district	5497342.232	718	15355.705		
Total	5537534.207	724			

Source: Primary data

The value of the F statistic namely 0.872 is not significant at the 5% level and hence we accept the null hypothesis. That is pepper yield per acre of organic farms does not differ between districts.

Testing whether yield per acre of coffee and pepper differs in organic and non-organic farms. The two-sample t-test is used to test the per-acre yield difference between coffee and pepper in organic and non-organic farms. The hypotheses put forward are:

Table 7: Group Statistics Yield difference between farms

Particulars	Type of farm	Number of farmers	Mean	Std. Deviation
Coffee Output per Acre	Organic farm	724	736.097	225.89
	Non-organic farm	200	923.754	232.85
Pepper Output per Acre	Organic farm	724	372.881	123.85
	Non-organic farm	200	529.696	215.17

Source: Primary data

The average yield of coffee per acre in organic farms in Kerala is 736 kg and of pepper it is 372 kg, whereas, non-organic farm output per acre of coffee and pepper is 923 kg and 529 kg respectively in Kerala. Similar to the findings given by Lampkin (1994), Borlaug (2002), Rajendran (2002), and Sharma (2004), the present study also finds that the yield on organic

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farms is significantly lower when compared to non-organic farms.

The productivity of organic farms is 20 to 30% lower than that of non-organic farms. In the case of non-organic farming, the large farm is more productive than the medium and small farms, while small farms are more productive than medium and large farms in the production of pepper.

The mean values of coffee output per acre between organic and non-organic farms vary significantly. Similarly, pepper output per acre among organic and non-organic farms also varies.

Table 8: Independent Samples Test

Particulars		t-value	Df	Significance
Coffee Output per Acre	Equal variances assumed	5.486	410	.000
Pepper Output per Acre	Equal variances assumed	7.533	410	.000

Source: Primary data

The value of the t statistic is significant at the 5% level in both cases and hence we reject the null hypothesis. That is yield per acre is greater for coffee and pepper in non-organic farms when compared to organic farms. The non-organic farms are more productive than organic farms.

Testing whether the profit per acre of organic farms differs from the experience of farmers

Statistical tool ANOVA is used to test whether profit per acre differs in organic farms due to differences in experience among the farmers. The hypotheses are:

Table 9: Profit per acre in organic farm

Years of experience	Number	Mean	Std. Deviation
Less than 5 years	120	290700.86	85465.03
5-10 years	238	279428.66	85129.50
Above 10 years	242	279224.43	76573.61
Total	600	281995.90	81896.18

Source: Primary data

ANOVA

Table 10: Comparison of Profit per acre among organic farms

Particulars	Sum of Squares	df	Mean Square	F-value	Sig.
Between Groups	8420358242.867	2	4210179121.433	.626	.535
Within Groups	2412800905299.605	722	6720893886.628		
Total	2421221263542.472	724			

Source: Primary data

The value of the F statistic, namely 0.626, is not significant at the 5% level; hence, the null hypothesis is accepted. That is, the profit per acre of organic farms is unaffected by the farmer

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experience. In the case of non-organic farmers, all of them have more than 10 years of experience, and hence ANOVA cannot be carried out.

Testing whether profit per acre differs between organic and non-organic farms

The two-sample t-test is used to find out whether profit per acre differs between organic and non-organic farms.

Table 11: Profit per acre in organic and non-organic farms

Category	Number	Mean	S.D	t-value	d.f	Significance
Organic	724	281996	81896			
Non-organic	200	326777	118154	3.411	410	0.001

Source: Primary data

The value of the t statistic, namely 3.411, is significant at a 5% level, and hence the null hypothesis is rejected. That is, profit per acre is greater in the case of non-organic farms when compared to organic farms. The profit per acre is greater in the case of non-organic farms when compared with organic farms. This is because of the lower yield per acre of organic farms. The result of the study is similar to that of Brumfield (2000). It is also found that the profit per acre of organic farms does not differ from the experience of organic farmers. There is a significant difference between the prices of organic and non-organic crops. The difference varies from 10 to 35%. Organic products receive premium prices when compared to non-organic products (Oberholtzer et al., 2005). In the case of coffee, the difference in price between organic and non-organic varied between 13% and 25%. The lower cost of production is a motivating factor for 33.1% of farmers. It is similar to the findings of Chakraborty (2005) and Reddy (2010).

The major challenge of organic agriculture is yield. Productivity in organic farming is limited by both nutrient shortages and high weed populations. The organic farming method is superior on account of the increased use of natural manures, lower cost of cultivation, higher soil fertility, better input use efficiency, reduced risk, increased self-reliance, and livelihood security of the farmers. Moreover, it has a positive impact on soil and water conservation, demonstrating the substantial potential for the sustenance of soil and water resources. Thus, organic farming has greater economic and environmental benefits. It is crucial for the government to formulate favourable policies, strategies, and schemes to promote organic farming methods in order to realize their full potential in Kerala.

4. CONCLUSIONS

Profitability in organic farming depends on crop choice, which is determined partly by environmental conditions that influence the yield and partly by the global demand for products and available governmental programs supporting those crops. The study shows the total cost of cultivation per acre, total revenue, net returns, and economic benefits of organic production at the farm level. Wayanad is the largest coffee producer and the second-largest pepper producer in Kerala. Coffee and pepper cultivation plays a vital role in the socio-economic development of these areas. Organic farming helps in mobilizing rural resources and generating higher

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income and employment opportunities in the Wayanad district. Organic production of pepper and coffee can generate more export earnings and environmental preservation. The area of organic farming is less in Wayanad but it has a large potential to cultivate the land through organic farming. Because, Wayanad has a large geographical and arable area, with a wide variety of Agro - Chemical Zones. Organic agriculture provides enhanced health for the soil, animals, and human beings.

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