A STUDY OF IMPACT OF FUTURE TRADING ON SPOT PRICES OF PEPPER – A STUDY IN WAYANAD DISTRICT OF KERALA

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CHAPTER I

INTRODUCTION

1.1 INTRODUCTION TO FUTURE TRADING

1.1.1 Future Trading

Future trading is a form of investment which involves speculating on the price of a commodity going up or down in the future. Commodity prices can change direction much faster than other investments, such as company stocks. Therefore, it is important for traders to stay on top of market announcements. Professional traders may use a wide number of techniques to do this, using fundamental information and technical indicators. Futures contracts perform two important functions of price discovery and price risk management with reference to the given commodities, which are useful to various segments of the economy. It is useful to producers because they can get an idea of the price likely to prevail at a future point of time and therefore decide between various competing commodities. It enables the consumer's get an idea of the price at which the commodity would be available at a future point of time. The consumers can do proper costing and also cover their purchases by entering into futures contracts. Futures trading are very useful for the exporters as it provides them an advance indication of prices likely to prevail in future and thereby help them in quoting a realistic price and thereby securing the export contracts in a competitive market. Having entered into export contracts, it enables them to hedge their risks by operating in futures market. Helps in price stabilization in times of violent price fluctuations and dampening. Encourages competition and acts as a price barometer for farmers and traders

1.1.2 Benefits of Futures Trading to Market Participants

Futures contracts provide several benefits to market participants. These are price discovery and price dissemination.

1.1.2.1 Price Discovery

Futures markets enable various players to discover the price of commodities and make informed decisions. Prices get disseminated instantaneously to everybody as the contract prices are available on the centralized trading screen of the exchange. The producer can access the prices and get an idea of what the future prices are likely to be. This information helps the producer to decide among various commodities. The consumer gets an idea of prices that would

be charged to him at points in the future. Exporters also find it easier to quote realistic prices and face competition better.

1.1.2.2 Price risk management

The larger, more frequent and more unforeseen price variability in a commodity, the greater is its price risk. The risk mitigation or "hedging" mechanism provided by the futures market provides an efficient and effective mechanism for management of price risks.

1.1.3 Benefits of Futures Markets to Farmers

The commodity price risk must be well-managed at the farmers' level in order to improve farmer's income and ensure adequate investments in agriculture. This management of price risk is very crucial for developing countries like India. Overcoming the problem of inadequate credit is linked to price risk management. This is because a person who is able to manage price risk will have better access to credit.

1.1.3.1 Empowering farmers

With the knowledge of the futures prices (long term price signals), farmers can make a better decision on what crops to plant during the ensuing season. They can analyze the prices likely to prevail at a future point of time and hence decide the best crop that suits them among various competing commodities. Farmers can thus avoid taking unproductive decisions based on current spot prices. Based on future prices, farmers can decide between selling their produce now or storing and selling at a later date at better prices. In fact, a survey indicates that many farmers nowadays stop selling when they see that futures prices are far higher than the prices that traders offer them. Even when the farmers decide to sell later, they can also choose the time at which they want to dispose off their produce.

1.1.3.2 Promoting Efficiency

Futures trading take place on a transparent electronic exchange with nationwide access. This environment encourages participation of several new players, thereby promoting liquidity and competition. For example, the participation of corporates like Cargill, Britannia, Reliance, Pantaloon and agencies such as Australian Wheat Board, Mark fed etc. in the commodity exchanges enhances the chances of direct procurement from farmers and shortening the value chain. Moreover, as physical proximity to the market is no longer an issue, farmers now have the opportunity to sell anywhere in the country through online trading

1.1.3 .3 Scientific Storage Infrastructure

Commodity exchanges have developed alliances with other agencies to ensure that farmers get scientific storage facilities. For example, NCDEX has promoted a company called the National Collateral Management Services Ltd. (NCMSL). NCMSL functions as a one-stop solution provider to assist farmers in all activities associated with delivery of physical commodities, like warehousing, assaying and collateral management. To help farmers in storing their commodities while waiting to sell at the best possible prices, NCMSL has tied up for storage space for nearly one million MTs with agencies like State Warehousing Corporations (SWCs), Punjab State Cooperative Supply & Marketing Federation Ltd (Punjab Markfed), Central Research Institute for Dryland Agriculture (CRIDA), etc.

1.1.3 .4Commodity Financing

Banks are generally not willing to lend against agricultural commodities held in warehouses, since they are not sure of the quantity, quality, grades and shelf life of the produce stored. Less than 1% of total bank credit is allocated for commodity finance. This problem is expected to be overcome soon. The chain of warehouses empanelled by NCMSL and other such companies are accredited and assigned ratings, based on certain specific parameters, to ensure standardization in their practices.

1.2 Future trading in India

The institution of formal commodity futures market in India is almost as old as in the USA and UK. The Indian experience, however, is much older as references to such markets in India appear in Kautialya's *Arthasastra*. The first organized futures market was established in 1875 under the aegis of the Bombay Cotton Trade Association to trade in cotton contracts which was followed by oilseeds and food grains. Before the Second World War, a large number of commodity exchanges were trading in futures contracts in several commodities like cotton, groundnut, groundnut oil, raw jute, jute goods, castor seed, wheat, rice, sugar and precious metals like gold and silver were flourishing throughout the country. During the Second World War futures trading was prohibited. After Independence, especially in the second half of the 1950s and first half of 1960s, commodity futures trading again started developing. However, due to shortage of commodities during the early and mid-sixties futures trading in most of the commodities was prohibited. Forward contracts are contracts for supply of goods and payment where supply of goods or payment or both take place after 11 days from the date of contract or

where delivery of goods is totally dispensed with. There are two broad categories of operators in the futures markets, namely, hedgers and speculators. Hedgers are those who have an underlying interest in the specific delivery or ready delivery contracts and are using futures market to insure themselves against adverse price fluctuations. The examples could be stockist, exporters and producers. They require some people who are prepared to accept the counter party position. Speculators are those who may not have an interest in the ready contracts, etc. but see an opportunity of price movement favorable to them. They are prepared to assume the risk which the hedgers are trying to cover in the futures market. They provide depth and liquidity to the market.

Major Indian Exchanges

1.2.1National Commodity and Derivatives Exchange Ltd. (NCDEX)

While the overall market share in the total traded volume of NCDEX as seen from the above table is 32%, NCDEX has over 80% share in respect of agricultural commodities. NCDEX is a professionally managed technology driven on-line multi commodity exchange. The shareholders are Life Insurance Corporation of India (LIC), National Bank for Agriculture and Rural Development (NABARD), National Stock Exchange of India Limited (NSE), Canara Bank, CRISIL Limited (formerly the Credit Rating Information Services of India Limited), Goldman Sachs, Intercontinental Exchange (ICE), Indian Farmers Fertilizer Cooperative Limited (IFFCO) and Punjab National Bank (PNB). NCDEX is the only commodity exchange in the country promoted by national level institutions.

1.2.2 Multi Commodity Exchange (MCX)Set up in 2003

MCX is an independent and de-mutualised commodity exchange. It has been promoted by Financial Technologies (I) Ltd. The other shareholders of the company include:• FID Funds (Mauritius) Ltd, • State Bank of India, • National Bank for Agriculture and Rural Development (NABARD), • Citigroup Strategic Holdings Mauritius Limited, • Merrill Lynch Holdings (Mauritius), and • IL & FS Trust Company Ltd.

1.3 Present marketing scenario of pepper in Kerala

1.3.1 Major trading centre's

Cochin is the major trading centre for black pepper even though upcountry markets such as Sulthan Bathery (major producing centre in Kerala) have emerged in the recent past.

1.3.2Market Influencing Factors

Indian pepper is at a premium against all the international grades. However, the production and exports of pepper from other locations has a profound influence on Indian pepper prices too. Weather and the annual production of a year. Year ending stocks and stocks-to-consumption ratio. Indian pepper arrives in the market in the beginning of the year. However, distress selling is not witnessed in pepper and the producers hold back the stock in anticipation of better prices. Government policies with regard to imports and exports. Traders allege large-scale imports of pepper from Sri Lanka and re-export from India as a major price-depressing factor and Government has been asked to take measures to stop this practice.

1.3.3 Pepper co-operatives

Market fed entered the field of pepper marketing in the year 1963-64 and achieved a major market share of pepper by 1979. Breaking boundaries of market, Market fed leaped into export market during 1976, and maintained its market share sowing steady progress. Government of India selected Market fed as the top most exporter of Black Pepper for the year 1979-80 and was an award winner. During the year 1985-86 they had purchased 5300 tones of pepper for Rs. 2240 lakhs and sold 4639 tons for Rs.2178 lakhs of which export accounts for about 2000 tons valued at Rs. 1050 lakhs. During 1992-93 they sold 257 MT valuing Rs. 70 lakhs, 1993-94 1324 MT valuing Rs. 594 lakhs, 1994-95 582 MT valuing Rs. 337 lakhs and 1995-96 337 MT valuing Rs. 282 lakhs.

The Kerala State Co-operative Marketing Federation stepped in to procure pepper directly from farmers at Rs375 a kg when the prices fell to around Rs50-55 in 2005. It procured nearly 5,000 tonnes, waited for prices to rise, and sold it in small quantities at prices as high as Rs100 a kg. It is still left with nearly 800 tonnes of the crop it acquired. The transparent and scientific manner of procurement instilled confidence in pepper growers.

1.4 Types of participants in the futures contract

1.4 .1Hedgers

Hedgers are the participants who wish to reduce price risk from potential price movements. To reduce the price risk, the farmer may choose to hedge in the futures market. In essence, the farmer transfers the risk he or she is unwilling to bear to the speculator. With

agricultural futures, the hedges normally goes short in the futures market, because the farmer wants to deliver something. The farmer promises to deliver, whereas the speculator goes long (promising to pay). It is also possible for a hedger to go long to protect some economic interest.

1.4 .2Speculators

Speculators like to take directional view of future price movements and take on the price risk. They buy and sell futures for a profit speculation provides protection against wide price fluctuations, offers liquidity to commodities, stabilize prices in different markets encourages grading and standardization and shifts market risk from producers to organized body of professional risk takers.

1.4 .3Arbitrageurs

Arbitrageurs exploit price differentials on some commodities contracts that are traded in two different markets. Arbitrage produces optimum buffer stock. They use imports and exports to smoothen the prices.

1.5 Future Market Design

1.5 .1**Contract design**

Grade of the commodity is specified by the exchange which also specifies premium/discount. The available maturities depend upon the season. The option can be changed any number of times up to maturity in the cash or physical settlement prices are decided by Daily Rate Committee.

1.5 .2**Trading System**

Generally it is an open cry out system. But online trading is installed now-a-days. For example for pepper in Cochin and castor oil in Mumbai-Vashi. The trading opens at 10 am and closes at 3 pm. Exchange establishes daily price limits based on previous days closing price. Once the price exceeds this limit, there can be no trading at lower price until next day.

Price determination is based on bids and offers emanating from all over the country. Also it is based on expectation of prices on maturity date. Transaction cost includes brokerage charges range from 0.1 to 0.25% of contract value. Transaction charges between Rs. 6 and Rs. 19 per lakh per contract. In case of delivery, brokerage may be 0.25 to 1.0 percent.

1.5 .3**Clearing system**

In India there are several stock market exchanges such as Multi commodity exchange of India (MCX), National Commodity and Derivative Exchange Ltd (NCDEX), National Multi Commodity Exchange (NMCE) etc.

The clearing system records the transactions by members. Risk management is done through system of initial margin. Profits or losses are paid by 11 am the following day. The settlement is either cash or physical delivery, and does not insist on delivery. Board of Governors consists of four from spot market, six from future market, two share holders, four nominated by FMC and 2 by the board.

1.6 Motivation of the study

Pepper is facing the volatility of prices. The amplitude of fluctuations of prices is sharp in case of pepper, downward volatility is the major problem that affected pepper crops recently. So in order to see whether future trading helps in giving a stable remunerative price to the farmers in case of pepper, and this is the reason for selecting this subject for the study.

1.7 Importance of the study

This study mainly helps to know whether the future trading pepper helps in price discovery and price risk management by the farmers and also whether protecting the farmers from volatility of prices. Since pepper is the major spice traded through future trading it gives a clear cut evidence of impact of future trading on spices and also since it is a major commodity now traded in future exchanges in the country reflects the impact of future trading on other commodities also.

1.8 OBJECTIVES OF THE STUDY

1. To study the degree of integration of future and spot prices of the pepper.
2. To analyse the volatility of future and spot prices
3. To identify the contribution of future prices in determining spot prices – i.e. price discovery.
4. To study the efficiency of commodity futures market and spot trading.
5. To identify whether future trading helps in price risk management by the farmers.

1.9 Hypothesis:

HO1: Spot price determination depends on the future prices

HO2: Future trading helps in price discovery

HO3: Future trading helps in risk management

1.10 METHODOLOGY

The study is based on both primary data and secondary data. The primary data is collected from the traders and farmers. The secondary data is collected mainly from NCDEX. In addition to this the secondary data is collected from various newspapers, research papers, journals, published books, seminar papers, etc.

1.10.1 Database

The data base refers to 2013-14 unless and otherwise it is stated. However the necessary secondary data for spot and future prices refers for 5 years from 2009-10 to 2013-14. The spot prices and future prices are collected to assess the impact of future trading on spot prices of pepper.

1.10.2 Statistical tools and techniques

The systematic statistical tools and techniques are adopted to draw a definite and precise conclusion on the study. In addition to this tables, graphs and charts generated from the analysis of both primary and secondary data collected for the study are also used to draw appropriate inferences.

The statistical techniques that are adopted in the study are time series analysis, ARIMA, transfer function, co-integration test and VaR. These helped to analyze whether spot prices depends on future prices, that is whether future trading helps in price discovery and to determine the volatility of future prices of pepper.

1.11 Scope and limitations of the study

The commodity selected for the study is pepper and the selected study area is Sulthan Bathery Taluk and Mananthavady taluk in Wayanad District of Kerala state. The study is restricted to five years commencing from 2008-09 to 2012-13.

1.12 Organization of the study

The study is organized in five chapters.

Chapter I gives the introduction on the subject selected for the study. A brief description of future trading, futures markets, commodities suitable for future trading, types of participants will be provided in this chapter. In addition to this the chapter includes significance of the study, the trade benefits, and more importantly objectives and hypothesis of the study.

Chapter II deals with Review of Literatures relating on the subject selected for the study.

Chapter III explains the Methodology, which includes the description of the study area, selection of commodity, data base and the statistical tools and techniques adopted for the study. The major techniques used in this study are time series analysis, ARIMA, transfer function, co-integration test and VaR.

Chapter IV highlights the production of pepper in Kerala for the period selected.

Chapter V deals with the future trading of pepper. This chapter mainly focuses the impact of future price on spot price of pepper.

Chapter VI deals with findings, summary, suggestions and conclusion.

Chapter II

Review of Literatures

CHAPTER II
REVIEW OF LITERATURES

Bharat Ramaswami et al (1960) In their paper "The Theory of Hedging and Speculation in Commodity Futures "the authors pointed out that the limited presence of futures exchanges in developing countries where commodity markets fall short of the ideal underscore the importance of understanding the relation between spot and futures markets. The paper examines the exceptional success of the soya oil contract at the National Board of Trade (NBOT) in India. The paper asks whether the NBOT contract exhibits the fundamental features of mature futures markets in terms of its use by hedgers.

L.S.Venkataraman (1965). His study "Theory of futures trading" was on relationship between ready and futures prices of cotton, the efficiency of hedging and utility of the Indian cotton futures contract traded at the East Indian Cotton Association, Bombay to Ledgers ,estimation of risk premium and probable variations in its size through the contract period,Price forecasts and inaccuracy of expectation ,factors determining size of stocks .

Margarete. Slade etal (1970) The authors in their paper "Commodity Spot Prices: An Exploratory Assessment of Market Structure and Forward-Trading Effects" assessed how characteristics of product and forward markets affect levels and volatilities of commodity spot prices. We examine (i) how product market structure and forward market trading affect spot market games, (ii) the links between product market structure and spot price stability, (iii) whether forward trading destabilizes spot prices, and (iv) how information arrival affects price volatility and the volume of trade. We find that market structure models of the price level but not of price stability receive support, that increased forward trading leads to lower prices, and that the relationship between trading and price instability is indirect via a common causal factor.

P. Nandakumar (1995) Feasibility study on a world wide pepper futures contract is a report is based on in-house analysis by the UNCTAD secretariat, supporting field work in India, Indonesia, Malaysia and Singapore was undertaken by Mr. P. Nandakumar, Consultant from Kochi, India. The study was organized in eight chapters. 1st chapter dealt with the economic role

of pepper, 2nd chapter deals trade channels, 3rd government pepper policies, 4th pepper prices and price volatility, 5th market integration, 6th the economic rational for pepper futures trade in which the need for risk management, price discovery, access to credit and Kochi pepper futures market are discussed. 7th Chapter dealt with the basic requirements for success for a world wide pepper futures contract.

Hung-Gay Fung et al (2003) The authors in their paper "Information Flows Between the U.S. and China Commodity Futures Trading" examined that using a bivariate GARCH model, patterns of information flows for three commodity futures traded in both the developed U.S. market and the emerging China market (copper, soybeans and wheat). For copper and soybeans, the two commodities that are subject to less government regulation and fewer import restrictions in China, we find that the U.S. futures market plays a dominant role in transmitting information to the Chinese market, a result that confirms the importance of the U.S. role as a leader in the global financial market. For the heavily regulated and subsidized wheat commodity, our empirical results indicate that the U.S.-China futures markets are highly segmented in pricing, although information transmission via volatility spillover across markets is present.

Anita Arya (2005) The author in her paper "does futures market help stabilize spot prices or increase speculations?" has raised concern about the lack of proper integration between spot and futures market. The author has examined the movements of prices of guar and sugar that have shown larger divergence between the respective spot and futures markets. Also found that the spot market for guar seed is highly volatile. The author concluded that speculation in futures market is largely responsible for increase in prices of sugar as well. futures prices at maturity cannot be different from the spot price prevailing in the market. The difference can never be long term phenomenon. The arbitraging will automatically align the prices within no time.

Jian yang et al (2005) The authors in their paper "Futures Trading Activity and Commodity Cash Price Volatility" examined the lead-lag relationship between futures trading activity (volume and open interest) and cash price volatility for major agricultural commodities. Granger causality tests and generalized forecast error variance decompositions show that an unexpected increase in futures trading volume uni-directionally causes an increase in cash price volatility for most commodities. Likewise, there is a weak causal feedback between open interest and cash price volatility. These findings are generally consistent with the destabilizing effect of futures trading on agricultural commodity markets.

Kataria et al (2005) They highlighted in their paper "Government intervention in physical market as major hindrance to futures market in India" that government intervention in physical market through various forms of controls as major hindrance to the growth of futures market in India. They have recommended a powerful and autonomous regulator for ensuring brighter future for commodity futures in the country.

K.G. Sahadevan(2005) In his paper " Globalization of Indian commodity future markets: some lessons from international experience" he pointed out that the regulation and governance of exchanges are of equal importance ;one without the other can never develop an oderly marketplace. When markets are deep,business rules and process are fair and transparent along with appropriate regulation ,the demarcation between an domestic and international exchange will cease to exist.

Khatkhar (2005) In his paper " Futures market offers an efficient price discovery mechanism" he profiled the spot and futures market traders. Based on the movement of prices of mustard, the authors concluded that the market is highly integrated and futures market price provided a lead to the spot market. This finding amounts to support the fact that futures market in mustard offers an efficient price discovery mechanism.

Golaka C. Nat et al (2005) In their paper "Commodity Derivative Market and its Impact on Spot Market" they examined that nation wide trading in commodities futures in India was introduced for many agricultural commodities and later trading in futures was banned for few commodities due to pressure on spot prices of these commodities. The paper studies the impact of futures trading in three important commodities which were banned by the government from trading in futures and their impact on spot prices. The study uses simple linear regressions, correlations, Granger Causality tests to find the answer. The study also tries to find if the seasonal/cyclical fluctuations in these commodities prices have been affected by the introduction of futures in those commodities. Hodrick-Prescott filter is used to differentiate the general trend and seasonal/cyclical fluctuations in prices. The study finds that in India future trading in the selected commodities had apparently led to increase in prices .

Pratap Ch Bawal (2005) In his paper "Price discovery in futures and spot commodity markets in India" he studied the relationship between commodity futures market and spot trading, role of commodity futures market in performing the function of price discovery in India and whether

price discovery function depends on whether new information is reflected first on futures or spot prices.

Abhijit Sen (2007) The Government had set up the five member expert committee headed by Planning Commission Member Abhijit Sen to study the extent of impact, if any of futures trading on wholesale and retail prices of agricultural commodities. The committee pointed out in its report that there is a strong co-relation between the futures trading and prices. It has found no conclusive evidence to prove that the price rise in essential commodities was caused by futures trading.

Niti Nandini Chatnani (2008) The author in her article 'commodity futures market in India rationale and relevance for farmers' pointed out that as India grows in a mature market economy we have to build proportionate legal and institutional structure, as we have done effectively for our equity markets. Future markets hold the key for agricultural liberalization and have been identified as the best option and mechanism to help the commodity sector including the farmers and protect them from the adverse effects of price volatility. They help farmers in linking national market and domestic spot market, empower farmers in crop selection, selling and holding allow for easy finance, provide risk management, (sell close to the harvest date to lock in current price), improve ecosystem, enhance rural employment and investment.

Shipla Jain (2008) The author in her article 'commodity markets -myths and realities' pointed out that it is not only the production, but the consumption demand also that affects the volumes of commodities. Also the exchanges have actually helped to reduce the volatility in prices. The prices are driven by market fundamentals, and no matter how much the margins are hiked, they will not affect spot prices significantly. Also using high margins will drive away smaller participants from the market that are not socially capable of depositing so much margin. All the efforts of the government, regulators and exchanges should focus on making the Indian commodity exchanges as the price setters for these commodities and not price takers.

Sumeet Gupta (2008) The author in her study "A study on future potential of commodity market in India with special reference to Rajasthan opined that development of the commodity derivatives market leads to the infrastructure and logistics improvement. T also leads to product quality improvement. In this study sampling technique is used to collect the primary data secondary data was collected. The author opined that commodities market is the stepping stone for a growing economy like India. Indian markets have recently opened up a new avenue for

retail investors and traders to participate in commodities derivatives. The current market situation is very critical if we analyze with reference to sensex and nifty. More and more investors are turning towards the commodity markets.

T. Kiran Kumar (2008) The author in his paper 'commodity futures -Guiding farmers to market' pointed out that the development of commodity markets will provide structural long lasting solutions to many persisting problems in India. The futures price is an indicator of the market price, and same is reflected in MSP. Commodity derivatives exchanges can play a vital role in procuring foodgrains for the PDS. Ensuring market discipline with information symmetry and strong internal regulations is mandatory. Since an efficient future market reflects right price based on economic fundamentals with a positive policy and regulatory frame work in force, the commodity future market in India will grow several steps. There is no other single or exclusive solution. It is only then that the commodity exchanges will live up to their promise, to infilterate the modern markets benefits to rural India.

Mohan Kumar B.S. et al (2008). The study "Is spot market leading maize futures? - A causality Approach" focuses on the lead –lag relationship between spot Nizamabad and Davanagere with that of maize futures market. The granger causality test revealed the evidence of mutual feed back mechanism between spot and futures prices as revealed by the significant correlation between error terms in the price series. It was noted that while futures prices lead spot by 2 or 3 or seven days, the spot prices also have a significant influence on futures price formation as the traders would consider the week end price for price quoting.

Chapter III

Methodology

CHAPTER III

METHODOLOGY

Systematic designing of the study is necessary for any research work. In this chapter source of data, analytical tools and analytical tools and techniques employed in the study are presented.

For any study collection of data is sine-qua-non. The data required for the study are collected from the various sources.The study is based on both primary and secondary data.

3.1 Primary source

The primary data is collected through direct personal interview with the producers and the traders of the pepper. This is collected by administrating the questionnaires.

Selection of respondents

Selection of respondents for the study is based on sampling. Producers of pepper are sampled using stratified random sampling technique while the traders are sampled using simple random technique.

Three taluks, Mananthavady,Vythiri and Sulthan Bathery of the district are selected for the study. Totally 90 farmers, 30 from each taluks are sampled based on their land holdings .10 each as big, medium and small farmers are selected from each taluks selected for the study.Totally 45 traders ,15 from each taluks selected for the study are sampled.

Table: 3.1

Sample size of farmers in percentage

Taluk	Sample size for farmers				Percentage
	Big*	Medium**	Small***	Total	
Mananthavady	10	10	10	30	33.33
Sulthan Bathery	10	10	10	30	33.33
Vythiri	10	10	10	30	33.33
Total	30	30	30	90	100.00

*-Farmers possessing land more than 10 hectares Source: Primary source

**-Farmers possessing land between 5 hectares and 10 hectares

***-Farmers possessing land less than 5 hectares

Table: 3.2

Sample size of traders in percentage

Taluk	Sample size for traders	Percentage
Mananthavady	15	33.33
Sulthan Bathery	15	33.33
Vythiri	15	33.33
Total	45	100.00

Source: Primary source

Table: 3.3

Level of education of the farmers

Level of education	Percentage
Primary	23.33
Secondary	38.33
College	38.34
Total	100.00

Source: Primary source

Above table(3.3) reveals that 100 % of the sampled farmers are literate, out of which 23.33% of farmers are having primary school of education,38.33 % of farmers are having secondary school of education and 38.34 % of farmers are having education at the college level. Average size of the family of the farmers is 5 and the age range of the farmers is from 31-68 years

Table : 3.4 Occupation of the farmers

Occupation	Percentage
Agriculture	98.3
Dairy	43.3

Source: Primary source

Above table (3.4) reveals that 98.3 % of the sampled farmers are having agriculture as main occupation. Only 1.7% of farmers are having non agriculture as main occupation. Only 43.3% of the sampled farmers are doing subsidiary occupation and they carry out only dairy as their subsidiary occupation.

Table: 3.5

Level of education of the traders

Level of Education	Percentage
Primary	23.3
Secondary	40.0
College	36.7
Total	100.0

Source: Primary source

Above table (3.4) reveals that 23.3% of the sampled traders have primary level of education,40% of the sampled traders have of the sampled traders have secondary level of education and 36.7%of the sampled traders have college level of education.100% of the sampled traders are literate.

3.2 Secondary source

The data regarding volume of trade spot prices and future prices of pepper in Cochin market are collected from NCDEX. Other data regarding the status of Kerala in pepper production and pepper trade are also collected from the Directorate of Economics and Statistic , Official website of Kerala government. Also data regarding the population, area and other agricultural statistics are collected from Department Of Farm Management government of Kerala.

3.3 Statistical tools and techniques used in the study

The systematic statistical tools and techniques are adopted to draw a definite and precise conclusion on the study. In addition to this tables, graphs and charts would be generated from the analysis of both primary and secondary data collected for the study are also used to draw appropriate inferences.

The statistical techniques which are adopted in the study are transfer function, standard deviation and co-efficient of variation and co-integration test. This will help to analyze whether spot prices depends on future prices, that is whether future trading helps in price discovery and to determine the volatility of future prices of pepper.

3.3.1 Time Series Analysis

Time series analysis is a statistical technique that deals with time series data. In time series analysis, time series data means that data is in a series of a particular time period. In time series analysis, data is considered in three types:

Time series data: In time series analysis, time series data is a set of observations on the values that a variable takes at different times.

Cross-sectional data: In time series analysis, Cross-section data is data of one or more variables, collected at the same point in time.

Pooled data: In time series analysis, pooled data is a combination of time series data and cross-sectional data.

3.3.1.1 ARIMA in time series analysis:

ARIMA in time series analysis stands for autoregressive integrated moving average method. This method is also known as the Box-Jenkins method.

Identification of ARIMA parameters:

Autoregressive component: In time series analysis, AR stands for autoregressive. In time series analysis, autocorrelation is denoted by p. When p =0, it means that there is no autocorrelation in the series. When p=1, it means that the series autocorrelation is till one lag.

Integrated: In ARIMA time series analysis, integrated is denoted by d. When d=0, it means the series is stationary and we do not need to take the difference of it. When d=1, it means that the series is not stationary and to make it stationary, we need to take the first difference. When d=2, it means that the series has been differenced twice. Usually, more than two time difference is not reliable.

Moving average component: In ARIMA time series analysis, MA stands for moving the average, which is denoted by q. In ARIMA, moving average q=1 means that it is an error term and there is autocorrelation with one lag.

In ARIMA model in time series analysis, in order to test weather or not the series and their error term is auto correlated, we usually use W-D test, ACF and PACF. To test the Stationarity of the series, unit test is preformed.

Decomposition: In time series analysis, decomposition refers to separating a time series into trend, cyclical, and irregular effects.

Assumptions in time series analysis:

Stationary: In time series analysis, the first assumption is that the series are stationary. This means that the series are normally distributed and the mean and variance are constant over a long time period.

Uncorrelated random error: In time series analysis, we assume that the error term is randomly distributed and the mean and variance are constant over a time period. The Durbin-Watson test is the standard test for correlated errors.

No outliers: In time series analysis, we assume that there is no outlier in the series. Outliers may affect conclusions strongly and can be misleading.

Random shocks: If shocks are present in the time series analysis, they are assumed to be randomly distributed with a mean of 0 and a constant variance.

The notation AR(p) refers to an autoregressive model of order p (Wikipedia 2006). Thus, an AR(p) model is written as

$$X_t = c + \sum_{i=1}^{p} \phi_i X_{t-i} + \epsilon_t.$$

where

$$\phi_1, \ldots \phi_p$$

are the parameters of the model, c is a constant and εt is an error term The constant term is omitted by many authors for simplicity .

An autoregressive model is essentially an infinite impulse response filter with some additional interpretation placed on it .

Some constraints are necessary on the values of the parameters of this model in order that the model remains stationary .

Moving average model

The notation MA(q) refers to a moving average model of order q. This is given by

$$X_t = \varepsilon_t + \sum_{i=1}^{q} \theta_i \varepsilon_{t-i}$$

where the θ1, ..., θq are the parameters of the model and the εt, εt-1,... are as in the AR model, the error terms .A moving average model is essentially a finite impulse response filter with some additional interpretation placed on it .Autoregressive moving average model Taking the AR model and the MA model, we get the ARMA model. The notation ARMA(p, q) refers to a model with p autoregressive terms and q moving average terms .This model subsumes the AR and MA models,

$$X_t = \varepsilon_t + \sum_{i=1}^{p} \phi_i X_{t-i} + \sum_{i=1}^{q} \theta_i \varepsilon_{t-i}.$$

The error terms εt are generally assumed to be independent identically-distributed random variables sampled from a normal distribution with zero mean: εt ~ N(0,σ2) where σ2 is the variance(Wikipedia 2006). These assumptions may be weakened but doing so will change the properties of the model. In particular, a change to the iid assumption would make a rather fundamental difference.ARIMA models in general can, after choosing p and q, be fitted by least squares regression to find the values of the parameters which minimise the error term .It is generally considered good practice to find the smallest values of p and q which provide an acceptable fit to the data .For a pure AR model then the Yule-Walker equations may be used to provide a fit . The dependence of Xt on past values and the error terms εt is assumed to be linear unless specified otherwise . If the dependence is non-linear the dependence of Xt on past values and the error terms εt is assumed to be linear unless specified otherwise. If the dependence is nonlinear, the model is specifically called a nonlinear moving average (NMA), nonlinear autoregressive (NAR), or nonlinear autoregressive moving average

3.3.3 Box-Jenkins models

Mathematical models used typically for accurate short-term forecasts of 'well-behaved' data (that shows predictable repetitive cycles and patterns). B-J models require at least a moderately long time series (with about a hundred observations) for an effective 'fitting,' and generally include autoregressive, moving average, and seasonal moving average terms, and difference and seasonal difference operators. Both ARMA model and ARIMA model are commonly called Box-Jenkins models after the US mathematicians George Box and Gwilym Jenkins who popularized them in their 1976 book 'Time Series Analysis-Forecasting And Control.'

3.3.4 Using one variable to predict another with the ARIMA (Box-Jenkins) approach- Transfer Function models.

3.3.4.1 Transfer Function

The modeling equation gathered from the free body diagram is in the time domain. Some analysis are easier to perform in the frequency domain. In order to convert to the frequency domain, apply the Laplace Transform to determine the transfer function of the system.

The Laplace Transform converts linear differential equations into algebraic expressions which are easier to manipulate. The Laplace Transform converts functions with a real dependent variable (such as time) into functions with a complex dependent variable (such as frequency, often represented by *s)*.

The transfer function is the ratio of the output Laplace Transform to the input Laplace Transform assuming zero initial conditions. Many important characteristics of dynamic or control systems can be determined from the transfer function.

The general procedure to find the transfer function of a linear differential equation from input to output is to take the Laplace Transforms of both sides assuming zero conditions, and to solve for the ratio of the output Laplace over the input Laplace.

How to find the transfer function

In most cases the governing equation will be linear, consisting of a variable and its derivatives. The Laplace Transform allows a linear equation to be converted into a polynomial. The most useful property of the Laplace Transform for finding the transfer function is the differentiation theorem.

In order to convert the time dependent governing equation to the frequency domain, perform the Laplace Transform to the input and output functions and their derivatives. These transformed functions must then be substituted back into the governing equation assuming zero initial conditions. Because the transfer function is defined as the output Laplace function over the input Laplace function, rearrange the equation to fit this form.

A transfer function is the ratio of output of a system to the input of a system, in the Laplace domain considering its initial conditions to be zero. If we have an input function of X(s) , and an output function Y(s), we define the transfer function H(s) to be

$$H(s) = \frac{Y(s)}{X(s)}$$

If pairs of observations are available at equispaced intervals of time of an
input X and an output Y from some dynamic system. The inertia of the system can be represented by a linear filter of the form in which the output deviation from some equilibrium at some time t is represented as a linear aggregate
of input deviations from equilibium at time t, t-1,

$Yt = voXt + v1Xt-1 + v2Xt-2 + ...$ The weights *v1, v2,……* are called the impulse response function of the system. This is because the *vj's* may be regarded as the output or response at times j ≥0 to a unit pulse input at time t=0, that is, to an input Xt such thatXt =1 if t=0, Xt =0 otherwise. The impulse response function is shown in the next page in the form of a bar chart. When there is no immediate response, one or more of the initial *v*'s, say *vo,v1,vb-1* , will be equal tozero.If we differenced the input and output series once, the same model as above prevails, i.e., measuring the change has the same model as the absolute values

Stability condition

If the sum of all the *v*'s is less than infinity, the system is stable. All the models we study are assumed to be stable, and therefore, we impose that condition and we must check that it is satisfied. The stability condition implies that a finite incremental change in the input results in anon-infinitesimal change in the output.

The requirement of stability is satisfied if the condition of stationarity for the ARMA part is satisfied.

More general model

It makes sense to imagine that the response variable depends also on values of the response variable in past times and ARIMA(p,d,q) noise Z.

$Yt = \delta 1 Yt-1 + \delta 2 Yt-2 + ... + voXt + v1Xt-1 + v2Xt-2 + ... + Zt$

Identification, fitting and checking of transfer function models

Identification Process

The two series X and Y must be made stationary before starting interpreting the cross correlation function. So the Autocorrelation Function of X and Y must be looked at first of all and appropriate pre-transformations and differencing

transformations must be made until the ACF dies down quickly or has a cut off kind of behavior for each. The cross correlation function between Y and lag values of X must then be analyzed. We need at least 50 pairs of observations to obtain a useful estimate of thecrosscorrelation function. If the cross correlation function dies quickly or has cutoff behavior, then there is stationarity.Significant cross correlations are those that have spikes significantly different from 0 (they lie outside the 2 standard error bands). Identify an ARIMA model for the input series X that you made stationary and apply this model to Y.Get the residuals from the model for X and the residuals of the model for Y. This is calledPrewhitening the series. Find the cross-correlation function between the residuals. This cross correlation function allows us to find the impulse response function. Use the estimates of the impulse response function to make guesses of the orders of the actual Y and X models.

Estimation

With the latter get initial estimates of the parameters. The software does that. Estimate the parameters for the Y and the X part of the model. With this last estimated model, you look at the residuals to determine what is the ARIMA model

for these residuals. Fit the final model that incorporates the ARIMA structure for the residuals

3.3.5 Co-integration test

Cointegration is an econometric property of time series variables. If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series are said to be cointegrated. For instance, a stock market index and the price of its associated futures contract move through time, each roughly following a random walk. Testing the hypothesis that there is a statistically significant connection between the futures price and the spot price could now be done by testing for a cointegrating vector. (If such a vector has a low order of integration

it can signify an equilibrium relationship between the original series, which are said to be cointegrated of an order below one.)

It is often said that cointegration is a means for correctly testing hypotheses concerning the relationships between two variables having unit roots. The usual procedure for testing hypotheses concerning the relationship between non-stationary variables was to run Ordinary Least Squares (OLS) regressions on data which had initially been differenced. Although this method is correct in large samples, cointegration provides more powerful tools when the data sets are of limited length, as most economic time-series are

Test

The three main methods for testing cointegration are

1 The Engle-Granger two-step method (null: no co integration, so residual is a random walk)

1 The Johansen procedure

2 Philips- quliaris Co-integration test available with R

Co integration is used for such series in typical econometric tests, but it is more generally applicable and can be used for variables integrated of higher order (to detect correlated accelerations or other second-difference effects). Multicointegration extends the co integration technique beyond two variables, and occasionally to variables integrated at different orders.

3.3.6 Value at risk

In financial mathematics and financial risk management, Value at Risk (VaR) is a widely used measure of the risk of loss on a specific portfolio of financial assets. For a given portfolio, probability and time horizon, VaR is defined as a threshold value such that the probability that the mark-to-market loss on the portfolio over the given time horizon exceeds this value (assuming normal markets and no trading in the portfolio) is the given probability level.

Risk measure and risk metric

The term “VaR” is used both for a risk measure and a risk metric. This sometimes leads to confusion. Sources earlier than 1995 usually emphasize the risk measure, later sources are more likely to emphasize the metric. The VaR risk measure defines risk as mark-to-market loss on a fixed portfolio over a fixed time horizon, assuming normal markets. There are many alternative risk measures in finance. Instead of mark-to-market, which uses market prices to define loss, loss is often defined as change in fundamental value. For example, if an institution holds a loan that declines in market price because interest rates go up, but has no change in cash

flows or credit quality, some systems do not recognize a loss. Or we could try to incorporate the economic cost of things not measured in daily financial statements, such as loss of market confidence or employee morale, impairment of brand names or lawsuits.

Rather than assuming a fixed portfolio over a fixed time horizon, some risk measures incorporate the effect of expected trading (such as a stop loss order) and consider the expected holding period of positions. Finally, some risk measures adjust for the possible effects of abnormal markets, rather than excluding them from the computation. The VaR risk metric summarizes the distribution of possible losses by a quantile, a point with a specified probability of greater losses. Common alternative metrics are standard deviation, mean absolute deviation, expected shortfall and downside risk

VaR risk measurement

In risk measurement, VaR is usually reported alongside other risk metrics such as standard deviation, expected shortfall and "greeks" (partial derivatives of portfolio value with respect to market factors). VaR is a distribution-free metric, that is it does not depend on assumptions about the probability distribution of future gains and losses. The probability level is chosen deep enough in the left tail of the loss distribution to be relevant for risk decisions, but not so deep as to be difficult to estimate with accuracy. Risk measurement VaR is sometimes called parametric VaR. This usage can be confusing, however, because it can be estimated either parametrically (for examples, variance-covariance VaR or delta-gamma VaR) or nonparametrically(for examples, historical simulation VaR or resampled VaR). The inverse usage makes more logical sense, because risk management VaR is fundamentally nonparametric, but it is seldom referred to as nonparametric VaR. The most popular and traditional measure of risk is volatility. The main problem with volatility.

3.3.6.1Methods of Calculating VAR

There are three methods of calculating VAR: the historical method, the variance-covariance method and the Monte Carlo simulation.

3.3.6.1Historical Method

The historical method simply re-organizes actual historical returns, putting them in order from worst to best. It then assumes that history will repeat itself, from a risk perspective

3.3.6.2. The Variance-Covariance Method

This method assumes that stock returns are normally distributed. In other words, it requires that we estimate only two factors - an expected (or average) return and a standard deviation - which allow us to plot a normal distribution curve

3.3.6.3. Monte Carlo Simulation

The third method involves developing a model for future stock price returns and running multiple hypothetical trials through the model. A Monte Carlo simulation refers to any method that randomly generates trials, but by itself does not tell us anything about the underlying methodology.

3.4 Presentation of data

The voluminous raw data collected through direct personal interview for the study are organized to present it in a readily comprehensible condensed form which will highlight the important characteristic of the data facilitate comparisons and render it suitable for further processing(statistical analysis) and interpretations.

The presentation of the data is broadly classified into the following categories.

i Tabular presentation

ii Diagrammatic or Graphic representation.

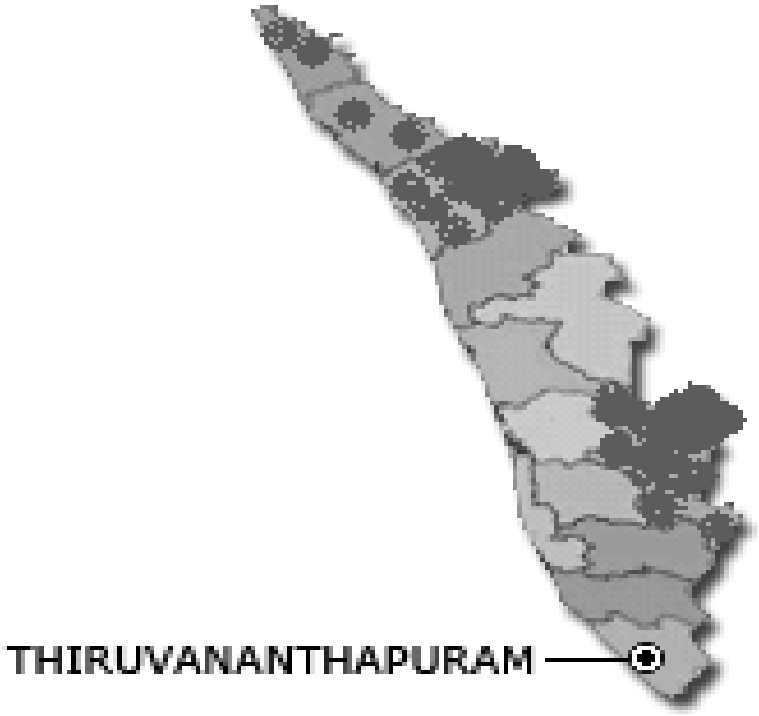
The present study used the pie charts, bar diagrams, line graphs, pictures and maps.

3.5 Profile of the study area

The area selected for the study is the Kerala State. In Kerala Sulthan Bathery is one of the major primary markets of the commodity pepper. Kerala accounts 90% of India's pepper production. Wayanad district which is in the Western Ghats accounts a major percentage of this. The climate in this region is suitable for the pepper cultivation. In Wayanad district Sulthan Bathery taluk leads in the area of cultivation and the production of the pepper in the district, so it is a major primary market in the state itself. Idduky is in the second place.

Map 3.4

Map of pepper producing districts of Kerala state



Kasargod, Wayanad, Cannore, Kozhikode and Idukki are the main pepper producing districts of Kerala state.

3.6Wayanad District

Map 3.5 Map of Wayanad district

Wayanad District, in the north-east of Kerala , India , was formed on November 1 , 1980 as the 12th district, carved out of Kozhikode and Kannur districts. The etymology of the word Wayanad is Vayal (paddy) Naad (land); 'Land of Paddy Fields'. There are many indigeneous tribals in this area.

Table: 3.6

Area and population of Wayanad district

District	Wayanad
Area (in sq.km.)	2,131
Population	8,17,420

Source-Official website of Kerala government

Table: 3.7

Taluks and headquarters and number of villages in each taluk of Wayanad district

Taluks	Head Quarters	No. of Villages
Vaithiri	Vaithiri	18
Sulthan Batheri	Sulthan Batheri	15
Mananthavadi	Mananthavadi	16

Source-Official website of Kerala government

Table: 3.8

Area and Average production of major agricultural products in Wayanad district

Major Agricultural Products		
Products	Area under cultivation (ha.)	Production in tone
Rice	12988	31326
Pepper	40839	12064
Ginger	3450	15164(cured)
Cardamom	4107	317
Cashewnut	1455	1283
Tapioca	1915	65180
Coconut	10947	51
Arecanut	7201	3237
Tea	6049	10983
Coffee	66973	52697
Rubber	6451	4753

Source-Official website of Kerala government

Chapter IV

Production of Pepper In Kerala

CHAPTER IV

PRODUCTION OF PEPPER IN KERALA

4. 1 Global scenario of pepper production

Pepper has been moving westward from India for 4000 years. It has been used in trading as an exchange medium like money and at times, has been valued so highly that a single pepper corn dropped on the floor would be hunted like a lost pearl.The international pepper Exchange is located in Kochi, in India.

Vietnam has recently become the world's largest producer and exporter of pepper. Other major producers include Indonesia, India, Brazil, Malaysia, Sri Lanka, Thailand and China. Vietnam dominates the export market followed by Indonesia, Brazil, Malaysia and then India.

Major world markets are New York, Singapore and Rotterdam (International Trading Centres). The primary international grades and their markets are Lampung at Panjang (Indonesia), Sarawak at Kuching (Malaysia), Vietnam at HEM city. However Malabar grade of pepper from India traded at Kochi, Kerala is considered to be the premium grade of pepper and rules above the international grades.

Table: 4.1

Pepper Production in Producing Countries in the world (in MT)

Sl no	**Country**	***Production in M.T**
1	Brazil	20,000
2	India	60,000
3	Indonesia	48,000
4	Malaysia	16,000
5	Thailand	10,000
6	Sri Lanka	4,100
7	Vietnam	20,000
8	China	11,000
9	Madagascar	2,400
10	Mexico	3800

*Approximate last 10 years average. Source from IPC

The approximate last 10 years average of pepper production in the world shows that India is the first in production(60000 MT) followed by Indonesia, Brazil, and Vietnam which is followed by Malaysia. Then comes China followed by Thailand, Srilanka, Madagascar and Mexico the least producer among the pepper producing countries in the world.

4. 2 Indian scenario of pepper production

In India, pepper cultivation is mainly confined to the Southern States of Kerala, Karnataka and Tamil Nadu. Altogether the total area under cultivation was estimated at around 220,620 ha, with Kerala accounting for almost 70% of the total production. There are many varieties of pepper developed and grown in India, including Karimunda, Kottanadan, Panniyur -1, Panniyur-3, Panniyur-4, Panniyur-5, PLD-2, Subhakara etc.

In India pepper production is declining also there is a great fluctuation in its price. In 2008-09 the production was about 45000-50000 tons. The decline is production is mainly due to the adverse climatic condition and diseases to pepper vines in major production centres.

Kerala accounts 90% of India pepper production. Other producers are Karnataka, Tamil Nadu and Andamans. Major Indian markets are Kochi and Sulthan Bathery in Kerala are the major primary markets Nagpur, Indore and Delhi have recently developed as the major up country markets for pepper. The share of India in global pepper export has declined to less than 10% during the last three years. The main factor for this drop is the competition from Vietnam. Though the share of India in raw pepper export has declined, India is the major producer of pepper oleoresin and pepper oil in the world. Nearly 90% of global pepper oleoresin is produced in India. Indian manufacturers are also turning themselves to be key players in grounded pepper exports.

As a highly traded commodity, global demand and supply plays a crucial role in shaping prices. Vietnam, a new entrant to pepper crop, sharply raised the total global supply by over 10000 ton by early years of 2000 led to a cash in pepper prices globally. Indian pepper costing over Rs. 200 per/kg in 2000 fell to an average of 65 Rs. Per kg by 2005 and shows an increase during 2011-13 up to 400-500 Rs. Per kg.

Table : 4.2

Area and production of pepper in India (Production in tones)

Pepper	Area (ha)	Production (t)
2005 – 06	213860	79000
2006 – 07	218220	80000
2007-08	223570	65000
2008 – 09	231880	62000
2009-10	235430	74260
2010-11	267112	81930
2011-12	257244	49997
2012-13	236177	49997

Source: Directorate of Economics And Statistics

Table: 4.3

State wise production (production in tones)

States	2008-09	2009-10	2010-11	2011-12	2012-13
Karnataka	12000	6236	15000	18240	16000
Kerala	33950	33991	27500	20640	16500
Tamil Nadu	1016	716	7500	9120	10500
TOTAL	49997	40943	50000	48000	43000

Source: Spice Board

The Kerala state leads in total pepper production from the year 2008 to 2013. The share of Kerala state is 67.9% in 2008-09. In 2009-10 it was 83%, in 2010-11 the share was 55%, In 2011-12 It was 43% and in 2012-13 the share was 38.3%.We can see a decrease in production in

Kerala state. The Kerala was followed by Karnataka and Tamilnadu they increases their production year by year.

Table: 4.4

State wise area (area in hectares)

States	2008-09	2009-10	2010-11	2011-12	2012-13
Karnataka	15150	18847	19706	21061	21061
Kerala	216710	153711	171489	172182	172182
Tamil Nadu	3700	3117	2786	3009	3009
TOTAL	236177	181299	198986	201381	201381

Source: Spice Board

Kerala stands first in area of pepper cultivation from 2008 to 2013 with an average share of 85.5% followed by Karnataka with an average share of 10.45%.

4.3 Pepper production in Kerala

Pepper is one of the major export oriented commodities in which the state continuous to enjoy a near monopoly in area and production. The productivity of pepper recorded during 2004-05 was only 327 kg. per ha. The production declined form 69015 MT during 2003-04 to 68362MT in 2004-05. Pepper produced in Kerala fetches a premium price in International Market in view of its intrinsic quality.

Table: 4.5

Area, production and productivity of black pepper in Kerala

Year	Area (ha)	Production (t)	Productivity (kg/ha)
2005 – 06	198406	57882	291.7
2006 – 07	202133	60929	301.4
2007-08	203956	58240	285.5

2008 – 09	208607	67358	322.9
2009-10	216440	69020	318.9
2010-11	237670	74980	315.5
2011-12	237998	87605	368.1
2012-13	226094	64264	284.2

Source: Directorate of Economics and Statistics

In Kerala there was an increase in area of cultivation of pepper from 2005-06 to 2011-12. But there was a decrease in 2012-13. Even the production data in Kerala showed an increasing trend from 2005-06 to 2011-12 which started decrease in 2012-13which declined from 91.55 to 67.9%. The average productivity of Kerala state was 311.03 kg/ha.There was decrease in productivity in 2012-13 (284.2 kg/ha) from 2011-12 (368.1kg/ha).

Table :4.6

District-wise area of pepper in Kerala (area in ha)

District	2008-09	2009-10	2010-11	2011-12
Thiruvananthapuram	5775	5668	6376	6569
Kollam	10170	10418	11381	10633
Pathanamthitta	4224	5059	5613	5214
Alappuzha	1943	2134	2054	1940
Kottayam	8499	8581	9139	9245
Idukki	57211	58209	60537	65142
Ernakulam	7002	7312	7941	7309
Thrissur	3861	3938	4174	4583
Palakkad	4844	4916	5063	5482
Malappuram	7885	8253	8996	9846
Kozhikode	11869	11939	12775	12365

Wayanad	44771	44908	40088	40839
Kannur	23301	24569	23341	22492
Kasaragod	7051	6229	6478	6948
State	198406	202133	203956	208607

Source: Directorate of Economics and Statistics

Table: 4.7

District	2008-09	2009-10	2010-11	2011-12
Thiruvananthapuram	1377	1705	1642	1760
Kollam	3269	3713	4275	3235
Pathanamthitta	912	1228	1455	1231
Alappuzha	242	297	196	174
Kottayam	777	1153	1372	1436
Idukki	13629	23282	24560	35534
Ernakulam	906	918	1219	1171
Thrissur	563	526	589	787
Palakkad	818	598	723	778
Malappuram	914	1053	616	979
Kozhikode	1806	2277	2722	1765
Wayanad	17332	17915	13083	12064
Kannur	3430	5038	4412	4362
Kasaragod	1568	1226	1376	2052
State	47543	60929	58240	67358

District-wise production of pepper (Production in tones)

Source: Directorate of Economics and Statistics

The district Idukki (29.6%) leads in production followed by Wayanad (20.9%).Where as in production Wayanad led first in earlier Years. But there was a decrease in production in Wayanad which brought Idukki to first place. The decrease in production in Wayanad was highly due to unfavourable climatic condition like reduction in rainfall and attack of pest and diseases.

Table : 4.8 District- wise productivity of pepper (Productivity t/ha)

District	2008-09	2009-10	2010-11	2011-12
Thiruvananthapuram	0.2384	0.3008	0.2575	0.2679
Kollam	0.3214	0.3564	0.3756	0.3042
Pathanamthitta	0.2159	0.2427	0.2592	0.2361
Alappuzha	0.1245	0.1392	0.0954	0.0897
Kottayam	0.0914	0.1344	0.1501	0.1553
Idukki	0.2382	0.4000	0.4057	0.5455
Ernakulam	0.1294	0.1255	0.1535	0.1602
Thrissur	0.1458	0.1336	0.1411	0.1717
Palakkad	0.1689	0.1216	0.1428	0.1419
Malappuram	0.1159	0.1276	0.0685	0.0994
Kozhikode	0.1522	0.1907	0.2131	0.1427
Wayanad	0.3871	0.3989	0.3264	0.2954
Kannur	0.1472	0.2051	0.1890	0.1939
Kasaragod	0.2224	0.1968	0.2124	0.2953
State	0.2396	0.3014	0.2856	0.3229

Source: Directorate of Economics and Statistics

The district Idukki leads in productivity (.4 t/ha) followed by Wayanad (.35 t/ha)

4.4 Pepper production in Wayanad district

Domestic production of pepper in 2008 is 50,000 tones. Production from Kerala and Tamil Nadu is expected to be lower in the next crop season and production from Karnataka higher by nearly 10%.

The cultivator also reported production of the aromatic Tellichery extra bold pepper from the Wayanad region in Kerala dropped drastically due to disease on the support tress on which the pepper vines climb and quick wilt disease affecting pepper vines.

4.5 Land holdings of the farmers in the study area

Table: 4.9

Type of land holdings of the farmers

Type of land	Percentage
Irrigated	30
Garden	100

Source : Primary source

Above table (4.9) reveals that Only 30% of the farmers possess irrigated type of land where as 100% of the farmers are possessing garden type of land. Average percentage of area used for the production of pepper by the sampled farmers-87.3%.Average area used for the production of pepper by the sampled farmers-6.72 ha. Average yield of pepper-196.8 kg/ha. Average production of pepper14.48 qtls

Table: 4.10

Average land holdings of the farmers (in hectares)

Type of land	Type of farmers			Average land holdings (ha)
	Big	Medium	Small	
Irrigated	1.5	1.4	0.86	1.25
Garden	13.91	7.05	2.74	7.9
Average holding	14.36	7.68	2.87	-

Source : Primary source

Above table (4.10) reveals that average land holdings of the big farmers is 14.36 ha , medium farmers is 7.68 ha and small farmers is 2.87 ha. Where as average irrigated land holding of big farmers is 1.5 ha , of medium farmers is 1.4 ha and of small farmers it is 0.86 ha. In case of garden type of land average land holding of big farmers is 13.91 ha , of medium farmers is 7.05 ha and of small farmers it is 2.74 ha. None of the farmers are having dry type of land. The

average irrigated type land holding of the sampled farmers is 1.25 ha and of garden type of land is 7.9 ha.

Table: 4.11

Average production per producer in last 5 years (in quintals)

Years	Average production (qtls)		
	Big farmers	Medium farmers	Small farmers
2008-09	45.15	25.7	10.66
2009-10	41.46	22.7	8.78
2010-11	35.23	19.12	7.72
2011-12	26.22	14.73	6.21
2012-13	23.93	11.98	4.75

Source: Primary source

Above table (4.11) reveals that in 2008-09 the average production per producer which comes under big farmers category is 45.15qtls, medium farmers production per producer is 25.7qtls and for small farmers it is 10.66qtls. In 2009-10 the average production per producer which comes under big farmers' category is 41.46qtls, medium farmer's production per producer is 22.7qtls and for small farmers it is 8.78qtls. In 2010-11 the average production per producer which comes under big farmer's category is 35.23qtls, medium farmer's production per producer is 19.12qtls and for small farmers it is 7.72qtls. In 2011-12 the average production per producer which comes under big farmer's category is 26.22qtls, medium farmers production per producer is 14.73qtls and for small farmers it is 6.21qtls. In 2012-13 the average production per producer which comes under big farmers category is 23.93qtls, medium farmers production per producer is 11.98qtls and for small farmers it is 4.75qtls. There is a decrease in the production for the last five years.

4.6 Pepper Grower's Association and Facilities extended by the government for pepper production

Table: 4.12

Facilities extended by the government

Type of farmers	Services	
	Crop loan	Subsidized vine cuttings
Big	100	100
Medium	100	100
Small	100	100

Above table (4.12) reveals that 100% of the sampled big ,medium and small farmers opined that they obtained services like crop loan and subsidized vine cuttings from the government

Table: 4.13

Services provided by grower's association in percentage

Services	Percentage
Plant protection measures	66.6
Subsidized vine cuttings	53.3

Above table (4.13) reveals that 66.6% of the farmers opined that they obtained plant protection measures from grower's association. Where as 53.3% opined that they obtained subsidized vine cuttings from the association

Chapter V

Future Trading

CHAPTER V
FUTURE TRADING OF PEPPER

5.1 Marketing of pepper

Pepper is marketed mainly as dried berries. The different agencies engaged in the marketing of the produce are hill produce merchants, marketing societies, commission agents and exporters. Being an export-oriented commodity, pepper prices show frequent fluctuations depending on the international prices prevailing for the commodity from time to time.

Table: 5.1

Marketing of pepper by lot size

Type	Reasons	Percentage
Farmers selling the whole surplus	Credit obligation	10
	61.7Price risk	55
	To meet cost of production of next season	5
Farmers not selling the produce by small quantity	Good price	15
	To meet cash needs	10
	Easy to transport	5
Total		100

Source: Primary source

Above table (5.1) reveals that 70% of the farmers are selling the produce all together. In this 10% is due to credit obligation, 55% is due to price risk and 5% is to meet cost of production for next season.30% of the farmers are selling the produce in small quantities, of which 15% is to get good price in each time, 10% is to meet cash needs and 5% opined it is easy to transport.

100% of the farmers are selling the produce in small quantities are selling their produce with maximum lot size 100kg and minimum lot size 5kg. 100% of the sampled farmers sell their produce to the local traders.81.67% of the sampled farmers have storage facility and their average storing period is 10 months. Whereas range of period of storage is 4months to12 months. Thus the storage facility of the farmers is satisfactory. Also 98.3% of the sampled farmers grade their produce before selling. Thus grading done by the farmers is also satisfactory.100% of the farmers are drying their produce by sun drying method. 100% of the sampled farmers and traders opined that peak season of pepper trade is January to March. Cent percentage of the sampled farmers opined that there is wide choice of people for selling their produce and there is easy access to markets.100% of the farmers opined t100% of the sampled farmers opined that the price is rising slightly compared to 5 years ago hat they are not getting remunerative price for last 5 years and their selling mode as cash.

Table: 5.2

Kind of information needed by the farmers for marketing

Information type	Percentage
Market opportunity	13.4
Price information	38.3
Both	48.3
Total	100.0

Source: Primary source

Above table (5.2) reveals that 13.4% of the farmers opined that information on market opportunity is required. Where as 38.3% opined that information on price is required. But 48.3% of the sampled farmers opined that information on both market opportunity and price is required.News paper is the main source of market price followed by the traders, neighbours, television, and radio respectively.

Table: 5.3

Average trade of pepper by the traders for the last five years from 2009-2013 (trade in tons)

Years	Trade (tons)
2009	3705
2010	4397.5
2013	3396.6
2012	2866.6
2013	2136.6

Source: Primary source

Above table(5.3) and figure (5.3) reveals that In 2009 average trade of pepper by the traders is 3705 tons, in 2010 average trade of pepper by the traders is 4397.5 tons, in 2011 average trade of pepper by the traders is 3396.6 tons, in 2007 average trade of pepper by the traders is 2866.6 tons and in 2008 average trade of pepper by the traders is 2136.6tons,

Table: 5.4

Average trade of pepper by the traders Average turns over of pepper per trader in last 5 years in from 2009-2013

(In crores)

Years	Turnover(crores)
2008-09	23.15
2009-10	29.15
2010-11	27.79
2011-12	28.49
2012-13	20.4

Source: Primary source

Above table (5.4) reveals that In 2008-09 average turnover of pepper by the traders is 23.15crores, in 2009-10 average turnover of pepper by the traders is 29.15crores, in 2010-11 average trade of pepper by the traders is 27.79crores, in 2011-12 average trade of pepper by the traders is 28.49crores and in 2012-13 average trade of pepper by the traders is 20.4crores.

Table: 5.5 Kind of information needed by the farmers for marketing Average trade of pepper by the traders Average turns over of pepper per trader

Purchase of commodity by the traders

Type	Percentage
Direct purchase	63.3
Indirect purchase	36.7
Total	100.0

Source: Primary source

Above table (5.5) reveals that 63.3% of the sampled traders are purchasing directly from the farmers .But 36.7% of traders are not purchasing directly. Out of 36.7 % of the traders not purchasing directly from the farmers percentage of them purchasing from other persons 90.9% of the 36.7 % of the traders who are not purchasing directly from the farmers are purchasing from small traders and 9.1% are purchasing from commission agents and brokers.

Producers response on future trading of pepper

Table: 5.6

Awareness of future trading by farmers (in percentage)

Level of Awareness	Percentage
Aware	88.3
Not aware	11.7
Total	100

Source: Primary source

Above table (5.6) reveals that 88.3% of the farmers are aware of future trading. But 100% of the farmers are not performing future trading due to lack of knowledge about the functioning of

future trading, use of tools available, technical and logistical limitations, various policies and regulatory controls.

Table: 5.7

Opinion of farmers on benefits of future trading

Benefits	Percentage
Price risk management	95
Price discovery	93.3

Source: Primary source

Above table (5.7) reveals that 95% of the farmers opined that future trading helps in price risk management and 93.3% of the farmers opined that future trading helps in price discovery.

Table: 5.8

Factors influencing on price

Factors	Percentage
Middle men	81.7
Less demand for exports	18.3
Total	100.0

Source: Primary source

Above table (5.8) reveals that 81.7% of the sampled farmers opined that middlemen is the influential factor on price. Whereas 18.3% of the farmers opined that less demand for export as the influential factor.

Traders response on benefits of future trading to the farmers

100% of the traders are aware of future trading. 40 % of the by the traders are performing future trading out of which 16.75 are acting as hedgers and 23.3% are acting as speculators.60% of the sampled traders are not doing future trading. Hence the performance of future trading by the traders is not satisfactory.

Table: 5.9

Traders view on benefits of future trading to the farmers

Opinion		Percentage
Beneficial	Remunerative price	3
	Save from price risk	87
No benefits		10
Total		100

Source: Primary source

Above table(5.9) reveals that 90 % of the traders opined that future trading is beneficial. In this 87% opined it helps from price risk and 3% opined that future trading gives remunerative price. 10 % opined that it is not beneficial.

Table: 5.10

Opinion of the traders about price risk management and price discovery of future trading

Opinion	Percentage
Price risk management	90
Price discovery	96.3

Source: Primary source

Above table (5.10) reveals that 90% of the traders opined that future trading helps in price risk management. 96.7% of the traders opined that future trading helps in price discovery.

Chapter VI

Findings, Suggestions And Conclusion

CHAPTER VI

FINDINGS, SUGGESTIONS AND CONCLUSION

6.1 Findings

The study was mainly to see the impact of future trading on spot prices of pepper. The first objective of the study was to study the degree of integration of future prices and spot prices of pepper. For this Co-integration test was used. The test result had shown that the future prices and spot prices are highly co-integrated. This also proves that future trading helps in efficient price discovery mechanism which is another objective of the study.

The second objective of the study was to analyse the volatility of future and spot prices. For this VaR method was used. The result had shown that the future prices are more volatile than the spot prices of pepper. That is spot prices are more stable than future prices.

The third objective of the study was to identify whether future trading helps in price discovery. For this ARIMA and using one variable to predict ARIMA(Box Jenkins model)-Transfer function method were used. The result had shown that the future prices lead spot prices by 1 or 4 days. This shows that future trading helps in price discovery.

Finally the last objective of the study was to identify whether future trading helps in price risk management by the farmers. For this opinion survey had done among the farmers and traders to find out whether farmers are aware of future trading, their participation and price risk management ability of future trading. This had shown that all farmers are aware of future trading. But none of them are participating due to lack of know-how.

Most of the farmers and traders opined that future trading helps in price risk management provided if they could engage in it properly and for that some structural and functional changes should be done. Also all these are possible only if all the participants of future trading get accurate information and support of policy makers.

6.1.1 Constraints faced by farmers for participating in future trading

1. There is a wide gap between spot and future prices which makes it inefficient for producers to hedge their price risk.
2. Small traders or producers are not able to utilize this platform because the minimum contract size traded o organized exchange for exceeds their annual production quantity.
3. There is a lack of knowledge and understanding of how to use the tools available, technical and logistical limitations, various policy and regulatory controls.

4. Transaction cost is a formidable barrier to the participation of farmers in futures market also it suffers from lack of liquidity.

6.2 Suggestions

The study had shown that the future trading helps in price discovery and price risk management. Also future trading leads to more stable spot market and the futures market and spot market are highly co-integrated. Also there are some constraints faced by the farmers.

The following measures are suggested to tackle the constraints.

1. There is a need to have strong market led extension to make the farmers knowledgeable and understandable about the futures trading functioning, use of tools available, technical and logistical limitations, various policies and regulatory controls.
2. The futures market should work with more price transparency, also efforts should be made to reach at grass root level and regulations of FMC as strict as of SEBI should be made then this can be model or price risk management instrument which can provide the producers with certainty about the minimum price they will receive for their crop and allow them to make more efficient farm management decisions regarding input use.
3. The farmers need to be educated and motivated to use the future trading platform. Concerted efforts have to be made to attract this segment to exchange traded futures.
4. A necessary function of a futures exchange in developing an efficient market is to enable the market participants to have information of current prices too.
5. The information on area under cultivation, progress of growth, changes in weather, crop destruction, international price movements etc which get incorporated into the market expectations and determine the price has to be made available to all market participants who can then conjecture the price movement which in turn will lead to efficient price discovery.
6. The exchange FMC needs to make future trading more convenient for farmers or producers to effectively use this platform for mitigating their price risk.
7. There should be aggregators who pool the requirements of the farmers a sufficient scale for hedging. The role can be played by co-operatives or NGOs or farmers associations.
8. All the efforts of the government, regulators and exchanges should focus on making the Indian commodity exchanges as the price setters and not price takers.

6.3 Conclusion

The producers face a spectrum of risks, which along with how they are managed, impact farm income and productivity while price, risk management instruments cannot deal with all of the risk, they provide a means for managing one of the biggest of these risks; the volatility of prices over the course of the season. Well functioning commodity exchanges systems of price risk management improve market efficiency for agricultural products and open up new production and marketing opportunities to producers. They reduce price risk by improving overall market liquidity, enhancing stability of local trading networks and by providing farmers with more certainty of expected future prices upon which they can make better managerial decisions. But all this is possible only if all the participants of futures trading get accurate information and support of policy makers. It is unrealistic to expect farmers in India to use futures as a tool of risk management. This is mainly because of lack of know-how, lack of collateral for margins, small scale operations and cumbersome nature of hedging transactions to administer. It is often suggested to have an aggregator who pools the requirements of the farmers a sufficient scale for hedging. The role can be played by a co-operative or NGO or farmers association. Though the proposition seems attractive it has its own set of constraints. So at best farmers may only benefit indirectly in terms of price discovery because of the existence of futures trading rater than use it for risk management. Commodities market is the stepping stone for a growing economy like India. Indian markets have recently opened up a new avenue for retail investors and traders to participate in commodities derivatives.s. Since an efficient future market reflects right price based on economic fundamentals with a positive policy and regulatory frame work in force, the commodity future market in India will grow several steps. There is no other single or exclusive solution. It is only then that the commodity exchanges will live up to their promise, to infiltrate the modern markets benefits to rural India. With global and domestic reforms in agriculture, the Government of India is reducing its direct market intervention and encouraging private participation based on market forces. This leads to exposure of agricultural commodities towards price and market risks, which consequently emphasize the importance of effective commodity futures market for price discovery, price risk management and efficient market delivery system

AnnexureI

A STUDY OF IMPACT OF FUTURE TRADING ON SPOT PRICES OF PEPPER – A STUDY IN WAYANAD DISTRICT OF KERALA

Questionnaire for Farmers

General information

Sl. No: _____ Date Of interview: _____

Name of the investigator _____

1. Name of the respondent _____

2. Age: _____

3. Taluk: _____

4. Sex: Male ☐ Female ☐

5. Size of the family: : Male ☐ male Tot ☐ ☐

6. Education: Literate/Illiterate

a). If literate, level of education: Primary/ secondary/college/others(specify)

7. Main occupation: Agriculture/ Non agriculture

Subsidiary occupation: dairy/sericulture/Animal husbandry/others

8. Land holdings

Type of land	Area in hectares
Dry	
Irrigated	
Garden	
Total	

Production of pepper -2012-2013

1. Do you produce pepper? Yes/ No

a) If yes do you produce pepper as a main crop or intercrop? Main crop/ intercrop

b).If you produce pepper as main crop

Years	2008-09	2009-10	2010-11	2011-12	2012-13
Total area(hectares)					
Yield (qtls / ha)					
Production(quintals)					

c) If as intercrop , What are the other crops cultivated by you in 2012-13 ?

Name of the crop	Area (hectares)	Yield	Production(quintals)

2) What is the percentage of area used for the production of pepper to the total land holdings?

3)Whether your costs of production changed over past 5 years? Yes/ no

4) Is there any pepper cooperatives in your region? Yes/ no

a) If yes are you a member? Yes/ No

5) Do you think it is beneficial? Yes/ No

a) If yes how? Getting good price to produce/ less cost of marketing/others(specify)

b) If no why? Not getting good price/ more cost of marketing/others(specify)

6) Is there any growers association? Yes/no

a) If yes are you a member of the association? Yes/no

b) i) If yes do you get any services from the growers association? Yes/no

ii) If yes what are those services? Mention: _____

7)Is there any specific programs/ policies to promote pepper production from the government? Yes/ no

a) If yes what are those? Crop insurance/ crop loans/ distribution of subsidized pepper vine cuttings/credit for installing irrigation facilities/ others

8) Have you availed crop insurance scheme provided by the government? Yes/ No

a) If yes what extent the scheme is beneficial? Less/ medium/ highly

b) If no why? Not beneficial/ not reaching the farmers in time/others

Marketing of pepper

1)What is the total output/ production in last five years?

Years	2008-09	2009-10	2010-11	2011-12	2012-13
Quantity(tones)					

2) Do you sell all your produce at once? Yes/ No

a) If yes why?
   i) to meet the credit obligation
   ii) low price risk in future date
   iii) to meet the next cost of production
   iv) lack of storage facilities
   iv) others (specify)

b) If not why?
   i. good price in future date
   ii. agreement with the trader
   iii. advised by the trader
   iv. others (specify)

3) Where do you sell the output?

local market/processing and packaging company/ local traders/ cooperatives/ exchange market/others

4) Do you sell all your surplus at a time? Yes/No

a)If no what is the lot size?

25kg/50kg/100kg/ more than100kg(specify)

5) Why do you sell small quantity each time?

i) to get good price
ii) to meet the cash needs
iii) it is preferable
iv) others (specify)

6) Do you have storage facilities for pepper? Yes/no

a) If yes how long do you store the produce ?

Days ☐ weeks ☐ months ☐

b) How do you store the pepper? Gunnybags/ plastic bags/ loose heads

7) Do you grade the pepper before selling? Yes /No

8) What is the drying process for the pepper? Heater/sun drying

9) Which is the peak season of pepper selling? March/April- may/June
Aug/sept-oct/nov

10) Do you have wide choice of whom to sell your produce? Yes/No

11) Do you have easier access to markets? Yes/No

11)What is your source of market price?

Sources	Ranking	sources	Ranking
Radio		Extention workers	
TV		internet	
Neighbours		newspaper	
Marketplace			
Traders			

11) Types of information needed

1) Marketing opportunity
2) Price information
3) Others

12) Is there any difficulty in transportation of the produce? Yes/No

13) Is there any constraints in marketing of pepper? Yes/no

a) If yes mention it:

Future trading

1) Are you aware of future trading of pepper? Yes/No

a) If yes, are you doing it? Yes/ No

b) If yes, are you doing future trading directly? Yes/no

2) If you analyse the price information in future days and the trader would agree to pay that price do you accept it? Yes/ no

a) If yes why?

b) If no why?

3) Do you think that future trading helps you in price risk management? Yes/No

4) Whether future trading helps in price discovery? Yes/No

5) What is your selling mode? In cash/ on credit

6) Are you getting a remunerative price for the pepper for last 5 years? Yes/No

7) What are the influential factors on price? Govt/ stock markets/middlemen/ others

8) What is the behavior of pepper prices now compared to 5 years ago?

AnnexureI

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Questionnaire For Traders

Sl.No: _____ Date: _____

Name of the investigator _____

1) Name of the trader _____
2) Age _____
3) Taluk _____

4). Sex: Male ☐ Female ☐

5). Size of the family: : Male ☐ Female ☐ Total ☐

6). Education: Literate/Illiterate

a). If literate level of education: Primary/ secondary/college/others(specify)

7) Year of establishment: _____

8)What are the commodities traded by you?

Commodities	2008-09	2009-10	2010-11	2011-12	2012-13
1)Pepper					
2)Ginger					
3)Coffee					
4)Rubber					
5)Others (specify)					

9) Total turnover of pepper in last five years

Years	2008-09	2009-10	2010-11	2011-12	2012-13
Pepper qty sold(MT)					

10) Do you purchase all the commodities from the farmers directly? Yes/no

a) if no where do you purchase? Small traders/ca/village traders/others (specify)

11) Are you aware of future trading? Yes/No

a) If yes, are you doing it? Yes/ no

b) If yes are you acting as a hedger / speculator

12) Do you think future trading is beneficial to farmers/ Yes/No

a) If yes, how it is beneficial?

i) Remunerative price
ii) Save from price risk

13) Are you a member of any traders association? Yes /no

a) If no why?

14) Whether future trading of pepper helps in price risk management of the crop/Yes/No

15) Whether it helps in price discovery? Yes/No

16) Which is the peak season of pepper trading? March-June/ Aug- Nov

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