

A STUDY ON THE IMPACT OF FALL IN RUBBER PRICES WITH RESPECT TO FARMERS IN KOTTAYAM DISTRICT

Ranjini S. Nambiar* and P. Balasubramanian*

Abstract: Around two lakh farmers in Kerala cultivate rubber. Among them 90% of the rubber growers are small and marginal farmers. They cultivate rubber in small holdings ranging from 10 Cent to 1 Hectares of land. It is also a significant that around one lakh traders are related with the rubber trading sector. More over a large number of workers are depended on rubber cultivation as tappers and manual labors. Hence one third of the population in Kerala directly depends upon the rubber cultivation.

The rubber price during the last two years falls steeply. In 2011 the natural rubber price was Rs. 248 per kg and it fell drastically during the subsequent years and came down to Rs. 80 per kg and the trend still persists. Such an alarming situation may cause even the suicide of the rubber growers in Kerala in the absence of any ray of hope.

The study basically attempts to study and analyze the fundamental factors that influence the price of Natural rubber in India. The study was done exclusively based on secondary data. The data were analyzed using graph, correlation and multiple regressions. Relationship between domestic price and international price was analyzed using Nominal Protection Coefficient. Based on the secondary objective to study the impact of fall in rubber prices with reference to farmers in Kottayam district and to study the socio economic profile of the farmers in Kottayam district, the data was collected by conducting direct interview scheduled through questionnaire with the farmers in Kottayam district. The living conditions of rubber cultivators are poor. Fall in rubber prices have affected the livelihood of farmers who depend only on rubber cultivation. Many of them have taken agricultural loans from banks or other private financing companies to meet the expenses of rubber cultivation. Without a minimum profitable price and support from the government and rubber board, it will be difficult for rubber growers to continue cultivation.

Keywords: Rubber price, Nominal Protection coefficient, International rubber price.

1. INTRODUCTION

Natural Rubber (NR) is extracted from rubber tree (*Havea Brasiliensis*) both in latex and coagulum form and processed into sheets, creeps, and technically specified block rubber to make the extract suitable for further processing into various end products. It is also considered as a material of strategic importance. Ribbed smoked sheet

* Research Scholar, Amrita School of Arts and Sciences, Kochi, Amrita Vishwa Vidyapeetham University

(RSS) is the most popular sheet rubber and is available for volume consumption in India. The major rubber producing countries of the world are of Thailand, Indonesia, Malaysia, India, Vietnam, and China. India is the fourth largest producer of NR after Thailand, Indonesia, and Vietnam. India is the second largest consumer of natural rubber in the world. It has the highest average productivity of 1443 kg per hectare. Production of natural rubber during 2014-15 was 6, 55,000 tonnes which is 15.4 per cent lower than 7, 74,000 tonnes produced in 2013-14, according to the latest figures released by the Rubber Board. As rubber demand exceeds domestic supply, Indian import volumes have been rising. From about 197,000 tonnes in 2011-12, imports expanded to 214,000 tonnes by 2013-14. The imports during fiscal 2014-15 are significantly higher at close to 300,000 tonnes. In India about 71 per cent of NR is processed as RSS grades. Among the 4327 licensed rubber goods manufacturing units in India, a vast majority are small –scale operators. Major world spot markets are Bangkok and Kualalumpur. Major futures exchanges are Tokyo Commodity Exchange, Singapore Commodity Exchange and Shangai Future Exchange.

Kerala is the leading rubber plantation state in India. The first commercial rubber plantation in India was established at Thattekadu in Kerala in 1902. The rubber growing regions are Malanaadu, Idanaadu, Kottayam, and Palakad. The small holdings under rubber in Kerala are mainly homestead planting. More than 93 per cent of the total area in small holdings sector is occupied by high yielding cultivators in Kerala.

2. OBJECTIVES OF THE STUDY

Primary Objective:

1. To study and analyze the fundamental factors that influences the price of Natural rubber in India.

Secondary Objectives:

1. To study the impact of fall in rubber prices with reference to farmers in Kottayam district of Kerala.
2. To study the socio economic profile of farmers in Kottayam district of Kerala.

3. METHODOLOGY OF THE STUDY

The study is descriptive where data was collected both from primary and secondary sources. Farmers from Kottayam district was considered for the study. Data was collected from 200 farmers from Kottayam district. The sampling technique used is **Simple Random Sampling** technique. The questionnaire was used for interviewing the respondent in person. In order to access the impact of fall in natural rubber prices on farmers, the primary data was collected by conducting direct interview scheduled through questionnaire with the farmers and members of Rubber Producers Society.

Secondary data have been collected from books, records, and other publications. Data were obtained from various sources such as the Rubber Board and the Rubber Manufacturers' Association. Data were also collected from the commodity reviews and reports of leading news papers like the Economic Times, Indian Express, The Hindu, Malayala Manorama, Mathrubhumi and Deepika. Data relating to area, production, consumption, export and import and price of NR in India and world were collected mainly from the websites of Rubber Board viz; (www.rubberboard.org.in). The movement of crude oil prices was collected from the website of Energy and Information Centre (www.eia.doe.gov).

4. DATA ANALYSIS

The collected data were analysed with the help of statistical tools like, growth rate, correlation co-efficient, ratios, regression analysis and graphs. Trend in area, production, productivity, consumption, export, and import were analysed using growth rate found by fitting trend lines and graphs. The relation between domestic and international price, crude oil and natural rubber price were analysed by working out the correlation coefficient. The relation between domestic and international price of NR was analysed on the basis of the price of RSS-4 in the domestic market (Kottayam) and the price of RSS-3 in Bangkok market and price of SMR-20 in Kuala Lumpur. The factors that affected the rubber prices were analysed using regression analysis. The tools used in this study are Paired Sample T Test, Chi Square test, Correlation and Regression. Data analysis was done using SPSS.

5. HYPOTHESIS OF THE STUDY

Paired sample T test, Chi-square and Correlation has been used to find out the relationship between variables.

Paired Sample T Test:

1. There is no significant relationship between domestic rubber price and factors influencing domestic rubber price.

Chi-Square Test:

1. There is no significant relationship between full time farmers and the awareness of price support scheme by the government.
2. There is no significant relationship between production costs increased in the year 2015 and changes in lifestyle of farmers.
3. There is no significant relationship between educational qualification of the rubber cultivators and their experience in rubber cultivation.
4. There is no significant relationship between income from rubber cultivation and the experience in rubber cultivation.

5. There is no significant relationship between number of untapped days in 2015 and the farmers affected by natural calamities.
6. There is no significant relationship between production costs increased in 2014 and decision regarding quitting or continuing rubber cultivation.

6. SCOPE OF THE STUDY

Rubber industry has an important role in the economic development of India. It provides some of the basic raw materials necessary for the industrial development. The study analysed the trend in area, production, productivity, consumption, export, import and price of rubber over two decades. The major factors influencing price are brought out by the study. The price behaviour of NR was analysed mainly based on the fundamentals. The impact of fall in rubber prices on farmers with reference to Kottayam district is another highlight of the study.

7. LIMITATIONS OF THE STUDY

The price of natural rubber is a function of several factors. However, the present study covered only a few factors like demand, supply, export, import, stock, international price, crude oil price, synthetic rubber price etc.

Variances in the data published by various sources can affect the objectivity of the observations. Due to time constraint samples from of Kottayam district alone will be studied.

8. FINDINGS OF THE STUDY

Based on the Primary objective to study and analyze the fundamental factors that influences the price of Natural rubber in India

The study was exclusively based on secondary data. The data were analysed using graph, correlation and multiple regressions. Relationship between domestic price and international price was analysed using Nominal Protection Coefficient.

Nominal Protection Coefficient (NPC) is a good measure of the export competitiveness of domestic products. The domestic prices are to be lower if the exports are to be competitive in the global market. When compared with RSS-3, the NPC was more than one during the period from July 2011 to October 2015, except in April 2012 and January 2013, rendering the Indian exports unattractive. The correlation between both the prices was found to be 0.96 which means that 96 per cent of the variation in domestic price can be explained by the variation in international price of RSS 3.

When compared with Kuala Lumpur price, throughout the reference period NPC remained more than one except in January 2011 and October 2012. The correlation between both the prices was 0.94 which means 94 per cent of the variance in domestic price (RSS-4) can be explained by the variation in international price (SMR-20).

The price of natural rubber is determined to a very large extent by the global crude oil price. The analysis indicates a 74 per cent correlation between rubber price and crude oil price from 2005 to 2014.

The price of NR ruled above SR price throughout the period. The difference between NR and SR price was the highest in July 2010 (Rs. 2296) followed by January 2015 (Rs. 1892). The correlation between NR and SR price was 0.99 per cent implying that 99 per cent of variation in NR price can be explained by SR price.

Among the various factors affecting domestic rubber price the significant determinants are synthetic rubber price, crude oil price, international price (Bangkok price), domestic production, domestic area under rubber cultivation and global consumption.

Table 1
Regression Results

<i>Model</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
1 (Constant)	-27808.093	45223.416		-.615	.582
Global production	-.005	.004	-1.114	-1.209	.313
Global consumption	.005	.003	1.037	1.491	.233
Domestic production	.069	.030	1.103	2.324	.103
Domestic consumption	-.025	.066	-.379	-.376	.732
Export	-.088	.143	-.429	-.619	.580
Domestic area	.023	.010	.323	2.294	.084
Bangkok price	.651	1.480	.681	.440	.683
Kualalampur price	-.566	.668	-.538	-.847	.445
Crude oil price	1.503	.170	-.540	-8.860	.001
Synthetic rubber price	1.019	1.154	1.037	.883	.427

- (a) Dependent Variable: average domestic price
- (b) Predictors: (Constant), Import, Domestic production, Global consumption, Export, Global production, Domestic consumption, Synthetic rubber price, Domestic area, Crude oil price, Kualalampur price, Bangkok price

Table 2
Model Summary

<i>Model</i>	<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Estimate</i>	<i>R Square Change</i>
1	.960 ^a	.922	.767	2332.925	.922

The Paired sample *t* test shows that there is significant relationship between domestic rubber price and factors influencing domestic rubber price.

Table 3
Paired Sample T Test

	Paired Differences							Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t		
				Lower	Upper			
Pair 1	Average price - Bangkok price	248.600	1336.388	422.603	-707.395	1204.595	.588	.571
Pair 2	Average price - kualalampur price	1303.900	1449.641	458.417	266.889	2340.911	2.844	.019
Pair 3	Average price - crude oil price	9021.315	3740.612	1182.885	6345.442	11697.188	7.627	.000
Pair 4	Average price - export	-22279.600	26983.350	8532.884	-41582.325	-2976.875	-2.611	.028
Pair 5	Average price - import	-181270.300	127562.18	40338.70	-272522.792	-90017.808	-4.494	.002
Pair 6	Average price - domestic area	-684016.200	65754.575	20793.42	-731054.189	-636978.21	-32.896	.000
Pair 7	Average price - global production	10602706.20	1098126.7	347258.1	-11388258.7	-9817153.6	-30.533	.000
Pair 8	Average price - global consumption	10439306.20	991195.06	313443.4	-11148364.4	-9730247.9	-33.305	.000
Pair 9	Average price - domestic production	-814117.700	75727.675	23947.19	-868290.015	-759945.38	-33.996	.000
Pair 10	Average price - domestic consumption	-903848.200	70370.208	22253.01	-954188.014	-853508.38	-40.617	.000
Pair 11	Average price - synthetic rubber price	925.400	1141.490	360.971	108.827	1741.973	2.564	.031

The correlations between domestic price of natural rubber and all the factors influencing domestic rubber price shows that all the factors except exports have positive correlation with domestic natural rubber price. The Indian natural rubber becomes more attractive in the global markets when the domestic natural rubber price decreases.

Table 4
Paired Samples Correlations

		<i>N</i>	<i>Correlation</i>	<i>Sig.</i>
Pair 1	Average price & Bangkok price	10	.965	.000
Pair 2	Average price & Kualalampur price	10	.954	.000
Pair 3	Average price & Crude oil price	10	.739	.015
Pair 4	Average price & Export	10	-.660	.038
Pair 5	Average price & Import	10	.571	.085
Pair 6	Average price & Domestic area	10	.755	.012
Pair 7	Average price & Global production	10	.688	.028
Pair 8	Average price & Global consumption	10	.669	.035
Pair 9	Average price & Domestic production	10	.275	.441
Pair 10	Average price & Domestic consumption	10	.775	.008
Pair 11	Average price & Synthetic rubber price	10	.973	.000

Based on the secondary objective to study the impact of fall in rubber prices with reference to farmers in Kottayam district and to study the socio economic profile of the farmers in Kottayam district of Kerala

The data was collected by conducting direct interview scheduled through questionnaire with the farmers of Kottayam district. The findings of the study are as follows:

1. Out of the total respondents, 40.5 per cent comes under the age category 35-45 years of age. 30.5 per cent of the respondents are in the age group 45-55 years of age. 29 per cent of the respondents are more than 55 years of age. As the educational qualification of youngsters is more, there interest towards rubber cultivation might be less.
2. More than 77 per cent of the respondents come under Male category and 22 per cent of the respondents were female. Male category shows more interest in rubber cultivation than females.
3. Out of 200 respondents around 60 percent of the respondents were Christians. 34.5 per cent of the respondents were Hindus. Only 6 per cent of the respondents were Muslims. Majority of the respondents considered for data collection were Hindus followed by Christians and Muslims.

4. Out of the 200 respondents, 94 per cent of the respondents were married and the remaining 6 per cent were widow/ widowers.
5. Out of the total respondents educational qualification of 54 per cent of the respondents are higher secondary. 26 per cent of the respondents are graduates. 14 per cent of the respondents have completed their secondary education. 9 per cent of the respondents have only done their primary education.
6. Out of the total respondents 77 per cent of them were full time growers. 23 per cent of the respondents are salaried employees doing rubber cultivation. Full time growers are considering rubber cultivation as a major source of their income.
7. 25 per cent of the respondents interviewed come under below poverty line and the other 75 per cent of the respondents are above poverty line. As the income from rubber cultivation is not stable, some of the respondents who depend only on rubber cultivation for their livelihood come under the BPL category.
8. Considering all areas of incomes and expenses of the family 55 per cent of population had net annual income between Rs. 50,000 and Rs. 3 lakhs. Net annual income of 33 per cent of the respondents was less than Rs. 50, 000. 11.5 percent of the respondents had an income range between Rs. 3,00,000 and Rs. 6,00,000. Other than rubber cultivation many respondents had other jobs. Some respondents had other intercrops.
9. Out of the total respondents 51.5 per cent earned below Rs. 50,000 from rubber cultivation. Around 39 per cent of the respondents earned an income between Rs. 50,001 – Rs. 1,00,000. 10 per cent of the respondents earned an income between Rs. 1,00,000 – Rs. 3,00,000. More number of respondents in the first category can be due to fall in rubber price. Many respondents have reduced the area of cultivation and some of them have even cut down trees.
10. 35 per cent of the respondents didn't have a titled thatched or concreted roof. More than 32 per cent have house with a concreted roof and nearly 20 per cent of the people have a house with tiled roof.. Only 13 per cent of the people have a house with thatched roof. 35 per cent of the people have a house with marble floor, 21 per cent have a granite floor and 19 percent have a mosaic floor. Information was collected regarding the details of house property of the respondents to analyze their standard of living. This shows a better standard of living of the people.
11. Around 43 per cent of the people have an experience between 10-20 years in rubber cultivation. 27 percent of the people have an experience of 20-30 years in rubber cultivation. 22 per cent of the people have less than 10 years of experience. Only 8 per cent of the people have more than 30 years of experience in rubber cultivation. As opined by the cultivators, increase in experience helps

in increasing the productivity. They are also more aware about the market conditions than the young cultivators.

12. Majority of the people (58 per cent) responded had an area between 1.1 – 2 acres under rubber cultivation. Almost 28 per cent of the respondents have an area of less than 1 acre. Around 15 per cent of the respondents have an area between 2.1 – 3 Acres. Small holdings form the backbone of rubber plantation sector in India. The sample consists of mainly rubber planters with small holdings.
13. More than 76 per cent of the people have adopted mono cropping. They are also not interested in cultivating other crops. But nearly 12 per cent of the people have adopted multiple cropping or intercropping. The intercrops cultivated along with rubber include yam and colocasia. Other multiple crops include ginger, banana, coconut, mango etc.
14. More than 40 per cent of the respondents have 301-400 trees planted in their land. 24 per cent of the respondents have 201-300 trees planted on their land. 22.5 per cent of the people who own less than 1 acre of land have less than 100 trees planted. 13 per cent of the people have planted 101-200 trees in their land.
15. When comparing the number of rubber trees tapped in the year 2014 to 2015, it can be clearly interpreted that number of trees tapped has come down drastically. In the year 2014, 48 per cent of the farmers tapped rubber tree in the range 151-200 per day. Only 17 per cent of the farmers have tapped 151-200 trees in the year 2015. More than 36 per cent of the farmers tapped more than 200 trees in the year 2014. On the other hand, only 5 per cent of the farmers have tapped more than 200 trees in the year 2015. Due to the fall in rubber price cost of production is more than the income earned from rubber production. This has led many farmers either to stop tapping or reduce the number of trees tapped in the year 2015.
16. During the year 2014 the farmers could not tap rubber for some days. 73 per cent of the farmers could not tap rubber for less than 50 days. 21 per cent of the farmers could not tap for 51-100 days. 6 per cent of the farmers could not tap the rubber for 102-150 days. The reason for loss in tapping days is said as rain, wind, health issues, etc.
17. 45 per cent responded that they are not affected by the natural calamities. On the other hand 54 per cent responded that they were affected by natural calamities. Natural calamities like rain, wind etc. which has led to the fall in rubber trees. It has also reduced the number of tapping days thereby reducing the overall productivity.
18. Out of the total respondents, more than 45 per cent of the respondents were tapping on alternate days. 29 per cent of the respondents tapped once in three days and 25 per cent of the respondents are tapping daily. Frequency of tapping is related with the price of rubber. When the rubber price falls down,

the cultivators reduce the number of tapping days in order to reduce tapping expenses.

19. More than 37 per cent of the respondents acquire the fertilizers from private traders. Only 19 per cent of the respondents acquire fertilizers from cooperative societies. 9 per cent of the respondents acquire fertilizers from RPS. There are cooperative societies and RPS providing fertilizers to the farmers. But the number of respondents availing such services is comparatively lower.
20. Out of the total respondents more than 55 per cent of the respondents produce sheets between 11– 20. Around 40 per cent of the respondents produce sheet in the range of 0-10 in a day. Only 5 per cent of the respondents are producing more than 20 sheets in a day.
21. 74 per cent of the respondents hired labors for tapping. 26 per cent of the respondents do not hire labors for tapping. Tapping charges for one tree is around Rs 2. Farmers with small land holdings may find it difficult to meet the expense of tapping especially when the rubber prices are falling down.
22. Out of 148 respondents who have hired labors, 93 percent of them have hired 1-3 labours. 7 per cent of them have hired 4-6 labours. Respondents with large area of land hires more labours for tapping purposes. Whereas tiny holders may find it difficult to hire more labors as the tapping charge per tree is Rs 2.
23. More than 53 percent of the respondents tap rubber themselves. 46.5 per cent of the respondents depend on hired labors alone for doing their tapping. Respondents who are mainly dependent on rubber cultivation tap rubber themselves.
24. 68.5 per cent of the respondents market their product as RSS. 31.5 per cent of the respondents are selling their product as latex. Farmers need to sell latex as early as possible. But RSS can be sold on a later date when the market is favorable for the farmer. Thus most of the farmers prefer to sell as RSS.
25. Out of all responses everyone produces RSS-4. Considering the value in international market every respondents produce RSS-4.
26. More than half of the respondents (54.5 per cent) have an opinion that latex is more profitable to sell. Remaining 45.5 per cent of the people responded that it is more profitable to sell sheet rubber than latex. Selling latex is more profitable than sheet rubber. But the sheet rubber can be stored and sold when the price goes up. But latex is sold at the time of extraction.
27. 53 per cent of the respondents own a rubber roller. Remaining 47 per cent does not own a rubber roller. Many respondents were from financially backward families. They could not afford to buy rollers of their own. Instead they hire rollers for the purpose of producing sheets.

28. 58 per cent of the respondents own a smoke house. Remaining 42 per cent does not own a smoke house.
29. Among the respondents 44 per cent sell rubber fortnightly. 34 per cent of the respondents sell rubber monthly and 22 per cent of the respondents sell weekly. Expectation regarding increase in rubber price in the future makes some of the farmers to sell their product monthly
30. Majority of the respondents (86 per cent) did not get any subsidy for new plantation. Whereas 14 per cent of the people responded that they got subsidy for new plantation. Subsidy is given under Rubber Plantation Development Scheme launched by the Government. But the number of persons covered under the scheme is less. Efforts must be taken to educate and bring the farmers under the scheme.
31. Majority of the respondents does not avail any subsidy for replantation. 23.5 per cent of the respondents availed subsidy.
32. 77.5 per cent of the farmers are engaged in replantation of rubber from the total number of respondents.
33. 51.5 per cent of the respondents did not give trees for slaughter tapping. Remaining 48.5 per cent provide the trees for slaughter tapping.
34. Majority of the farmers sell rubber wood after slaughter tapping. Out of 97 farmers who give trees for slaughter tapping, 87 (90 per cent) of them sell rubber wood after slaughter tapping.
35. Around 51 per cent of the respondents are not members of any such organization. 49 per cent of the respondents are part of either RPS or Cooperatives. The number of members coming under its roof must be widened to make the growth inclusive.
36. The income of 31 per cent of the farmers was in between Rs. 1001 – Rs. 3000 per day. More than 51 per cent of the farmers had an income range of Rs. 3001 – Rs. 5000. 17.5 per cent of the respondents come under the income range of Rs. 5001 – Rs. 8000. Income for a day depends up on the area of cultivated land holdings of the farmer. The income of farmers with cultivable land less than 1 ha were in between Rs. 1001 – Rs. 3000 a day. Income of farmers with cultivable land within 1-3 ha was in between Rs. 3001 – Rs. 5001 a day. The income of farmers with cultivable land more than 3 ha was between Rs. 5001 – Rs. 8000 a day. When the prices came down the rate of income came down to a level below Rs. 800.
37. 55 per cent had an opinion that rubber cultivation will become profitable when the rubber price come up to the range of Rs. 201 – Rs. 250. 28 per cent responded the minimum profitable price to make rubber cultivation profitable

is Rs. 151 – Rs. 200. 17 per cent of the respondents have an opinion that the minimum profitable price to make rubber cultivation profitable is Rs. 251 – Rs. 300.

38. From the response of 89 per cent of the respondents, it is clear that the cost of production has increased in the year 2015-16. Only 11 per cent responded that there was not much change in the cost of production. Production cost has increased due to the increase in the cost of materials used for rubber production. The cost of fertilizers has increased from Rs. 30/Kg to Rs. 80/Kg. The cost of pesticides has increased from Rs. 350 to Rs. 650 per litre. Tapping charges has also increased from Rs. 50 to Rs. 70. The cost of rain guards, cups, knives has also increases from Rs. 250 to Rs. 350. The total cost of producing one rubber sheet is Rs. 20.
39. Majority of the respondents (62 per cent) are not able to reduce the tapping charges whereas 38 per cent of the respondents were able to reduce the tapping charges. Tapping charges increased from Rs. 50 to Rs. 70. Tapping charges cannot be completely controlled. But 38 per cent of the respondents have cut down tapping charges by reducing the number of tapping days due to the fall in rubber prices. Some full time farmers started tapping themselves.
40. Fall in the rubber price changed the lifestyle of farmers in a negative way. They have to reduce their expenses incurred on food, investments, travel and entertainment and socialization. 48.5 per cent of the respondents have made changes in their family food habits. 22.5 per cent of the farmers have reduced their travel and entertainment. 17 per cent farmers have reduced their investments. 12 per cent of them have made changes in their socialization.
41. With plunging rubber prices, Kerala government announced a price support scheme whereby government would ensure that small-scale rubber growers with two hectares of land or less get an assured price of Rs. 150. Out of the total respondents 53 per cent of the respondents are not aware of the price support scheme by the government. 47 per cent of the respondents are aware of the price support scheme by the government.
42. Out of the total respondents 79 per cent of the respondents are not registered under the scheme. Only 21 per cent of the total respondents have registered under the scheme.
43. Out of the total respondents 34 per cent have the opinion that the scheme is good for rubber growers. 34 per cent of the respondents responded neutral and 32 per cent responded it as not good for rubber growers. Majority of the respondents replied negatively to the question mainly because of the unawareness about the scheme. An assured price of Rs. 150 per kg is a good scheme by the government. But the farmers should be made aware of the scheme by the government.

44. Due to the fall in rubber prices and increase in the cost of production many farmers has cut down yielding rubber trees. 52.5 per cent cut down yielding rubber trees. 47.5 per cent of them have not cut rubber trees. Fall in rubber prices, increase in the cost of production and low demand of domestic rubber by the tyre companies made the rubber farmers to cut down trees and plan other crops instead.
45. Out of the total respondents 42.5 per cent of the respondents have an opinion that government policies are the main reason for the fall in rubber price. Global factors are the reason for 34.5 per cent of the respondents. 23 per cent thinks some other factors are responsible for fall in rubber price. Majority of the respondents blame the government policies regarding import for the fall in rubber prices. According to their opinion reducing the import can save the domestic rubber market. Another group of respondents considers global factors like crude oil price, exchange rate and international rubber price are the reasons for the damage caused to rubber market in Kerala. Another group considers other factors like hoarding, black marketing, synthetic rubber price; demand and supply factors affect the rubber prices.
46. 72 per cent of the respondents have optimism that rubber price will increase in the future. 28 per cent believes that it will not come up in the near future. Changing the import policy by government, supporting the domestic price provides farmers with optimism of increase in rubber price.
47. 52.5 per cent of the respondents and 68.5 per cent of the respondents have not sold any physical or financial property. 47.5 per cent of the respondents have sold physical property and 31.5 per cent of the people have sold financial property.
48. Out of the total respondents 54.5 per cent of them have taken loans due to fall in rubber price. Remaining 45 per cent has not taken any loans. Fall in rubber prices have affected the livelihood of farmers who depend only on rubber cultivation.
49. Out of the total respondents 17 per cent of them have defaulted loan repayments due to fall in rubber prices. But none of them are facing any revenue recovery steps.
50. Out of the total respondents 30 per cent of the respondents quit rubber cultivation due to fall in the rubber prices. Remaining 70 per cent still continue cultivation. Without a minimum profitable price and support from the government and rubber board, it will be difficult for rubber growers to continue cultivation. Rubber growers who are depending only on rubber cultivation couldn't quit as they do not have any other source of income.
51. Small and marginal farmers are unaware of the market trend and they are the primary victims of the price volatility. Most of them used to sell the natural

rubber immediately after making it so as to meet their day to day livelihood. Often they could not manage to get even the market prices.

52. While calculating the production cost one has to consider the expenses of the first six years so as to plant and nurture the rubber tree. It is estimated that a farmer has to spend around Rs. 70000/per Acre during this period. When the tapping started after six years, the production cost including recurring expenses and wages is estimated as Rs. 32850/per year per Acre. If tapping is done for 110 days Total income per year per Acre is calculated as Rs . 180840 on the basis of the current market prices. It excluded the farmer's labour and his wages and his family's assistance. It vividly vindicates the fact that a rubber farmer who cultivates rubber in one Acre is not getting the wages of even a last grade employee.
53. There is significant relationship between full time farmers and the awareness of price support scheme by the government. Full time farmers meet their livelihood needs from the income from rubber cultivation. They are more interested and avail such benefits provided by the government.
54. There is significant relationship between the increase in cost of rubber cultivation and the changes in lifestyle of farmers in of Kottaym district. The increase in cost and decrease in income has forced the farmers to change their lifestyles.
55. There is significant relationship between income from rubber cultivation and the experience in rubber cultivation. Experienced respondents are more aware of the methods, practices and innovations. Experienced cultivators are able to generate more income than the less experienced farmers.
56. There is relationship between educational qualification and experience in rubber cultivation. Majority of the respondents are educated up to higher secondary. More educated respondents opt for other occupation as their career.
57. There is relationship between number of days not tapped in 2015 and the farmers affected by natural calamities. Farmers have reduced tapping days due to natural calamities like wind and rain which has led to the falling of rubber trees.
58. There is relationship between costs increased in last year and decision regarding quitting or continuing rubber cultivation. Increase in cost and the falling down of rubber prices will force the rubber growers to quit rubber cultivation.

9. SUGGESTIONS

1. Minimum Support Price of the natural rubber should be fixed as Rs . 200/per kg considering the increased production cost.
2. State government should take initiative for the procurement of the rubber through the Rubber Board.
3. Price stabilisation fund scheme has to be made efficient in the rubber sector.

4. Considering the acute crisis the government has to put a ban on import of rubber products and natural rubber imports.
5. The import duty on Natural Rubber has to be hiked considering the price volatility of the NR in the international market.
6. Ban imports of rubber through duty-free channel.
7. Increase the subsidy given by the Rubber Board as Rs. 50000/per Acre.
8. Set up rubber allied medium and small scale industries.
9. Set up a scheme for re-plantation of the rubber trees so as to increase productivity.

10. CONCLUSION

Based on the above facts, we can conclude that the living conditions of rubber cultivators are poor. Their average income lags behind average expenditure by a significant margin. Their debt position is becoming worse. Most of them have no alternative sources of income. Backwardness in the field of education and culture is evident. They are deprived off proper education due to lack of money and awareness. As the wage is price elastic to some extent, the decreasing tendency of natural rubber price may cause further worsening of the living conditions of tappers. Women tappers represent only a small per cent of total sample tappers. Generally, they are forced to enter the field of tapping because of financial crisis of concerned families. They do not have any job satisfaction, because it is difficult to manage both tapping and household works. Majority of the sample tappers are even unaware of institutions such as Rubber Board, Marketing Societies, and Rubber Producing Societies etc. They have not had any training in the techniques of tapping. Fall in the rubber price changed the lifestyle of farmers in a negative way. They have to reduce their expenses incurred on food, investments, travel and entertainment and socialization. Fall in rubber prices have affected the livelihood of farmers who depend only on rubber cultivation. Many of them have taken agricultural loans from banks or other private financing companies to meet the expenses of rubber cultivation. Without a minimum profitable price and support from the government and rubber board, it will be difficult for rubber growers to continue cultivation.

Reference

- Antoniou, A. and Foster, A. J. (1994). "Short-term and long-term efficiency in commodity spot and futures markets," *Financial Markets, Institutions and Instruments*, 3: 17-35.
- Bingcheng Yan and Eric Zivot, 2007. "The Dynamics of Price Discovery," *Working Papers UWEC-2005-01-R*, University of Washington, Department of Economics, revised Mar 2007.
- Caporale, Guglielmo Maria and Giradi, Alessandro, 2013. "Price discovery and trade fragmentation in a multi-market environment: Evidence from the MTS system," *Journal of Banking & Finance*, Elsevier, Vol. 37 (2), pp. 227-240.

- Ding, David K. and Harris, Frederick H. deB. and Lau, Sie Ting & McNish, Thomas, 1999. "An Investigation of price discovery in informationally- Linked markets: equity in Malaysia and Singapore," *Journal of Multinational Financial Management*, Elsevier, Vol. 9 (3-4), pages 317-329, November.
- Easwaran RS, Ramasundaram P (2008). Whether commodity futures market in agriculture is efficient in price discovery? An econometric analysis." *Applied Economics Research Review*, 21, 337-344.
- Evans, George W & Reichlin, Lucrezia, 1993. "Information Forecasts and Measurement of the Business Cycle", *CEPR Discussion Papers* 756, C.E.P.R Discussipn Papers.
- Figuerola-Ferretti, I. and C. L. Gilbert (2005). Price discovery in the aluminium market. *Journal of Futures Markets* 25, 967-988.
- Hasbrouck, Joel, 1995. "One Security. Many Markets: Determining the Contributions to Price Discovery," *Journal of Finance*, American Finance Association. Vol. 50 (4), pp. 1175-99, September.
- Johansen, Soren, 1991. "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometric Society*, Vol. 59(6), pp. 1551-80, November.
- Mattos, Fabio & Garcia, Philip, 2004. "Price discovery in Thinly Traded Markets : Cash and Futures Relationships in Brazilian Agricultural Futures Markets," 2004 Conference, April 19-20, 2004, St. Louis Missouri 19019, NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management.
- Michael Melvin and Joachim Gramming and Christian Schlag, "Price discovery I International Equity Trading," *Working Papers* 2133299, Department of Economics, W.P. Carey School of Business, Arizona State University.
- Pantisa Pavabutr and Piyamas Chaihetphon, 2010. "Price discovery in the Indian gold future marke" , *Journal of Economics and Finance*, Springer. Vol. 34 (4), pp. 455-467, October.
- P., Srinivasan, 2011. "Price discovery and Volatility Spillovers in Indian Spot- Futures Commodity Market," *MPRA Paper* 47412, University Library of Munich, Munich, Germany.
- Sabel Figuerola-Ferretti & Jesus Gonzalo, 2007. "Modelling and measuring price discovery in commodity market", *Business Economics Working Papers* Universisd Carlos III, Departmebto de Economia de la Empresa.
- Sapp, Stephen G., 2001. "Price Leadership in the spot Foreign Exchange Market," *Journal of Financial and Quantitative Analysis*, Cambridge University Press, Vol. 37 (03), pages 425-448, September.
- Wang, Jianxin & Yang, Minxian, 2011. "Housewives of Tokyo versus the gnomes of Zurich: Measuring price discovery in sequential markets" , *journal of Financial Markets*, Elsevier, Vol. 14(1), pages 82-108, February.
- Yang, Jian and Leatham, David J., 1999. "Price Discovery in Futures Market," *Journal of Agricultural and Applied Economics*, Southern Agricultural Economics association, Vol. 31(02), August.
- Zapata, T., Randall Fortenbery, T.R and Armstrong, D. (2005). "Price Discovery in the World Sugar Futures and Cash Markets: Implications for the Dominican Republic," *Staff Working Paper* No. 469, University of Wisconsin Agricultural and Applied Economics.