

Economic Scenario of Natural Rubber Production and Marketing in Kerala

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Abstract

Kerala is the nearly monopolistic contributor to the natural rubber production of India with 90 % of the total production and 78 % of the area under cultivation in the country. The natural rubber production of the state during 2010-11 was 7.71 lakh tonnes and the coverage under the crop was 5.34 lakh ha. The productivity in Kerala was found to be less compared to the national average *i.e.*, 1419 against 1784 kg/ha, during 2009-10. In Kerala, around 40 per cent of the area as well as 45 per cent of production of rubber comes from three districts; Kottayam, Ernakulam and Pathanamthitta and small holders contributed 92.5 % to the total production. Trend analysis using index numbers showed that over a period of last 25 years, the area under rubber and its productivity increased to an extent of 46 per cent and 135 per cent respectively and resulted in 244 per cent rise in NR production in Kerala. The instability in area, production and productivity during the period were 2.56, 5.84 and 6.37 per cent respectively. The decomposition analysis showed that the yield effect is contributing nearly two fold to the total production compared to the area effect. Ribbed Smoked Sheet (RSS), Latex Concentrates (LC), Technically Specified Rubber (TSR), Pale Latex Crepe (PLC) and Estate Brown Crepe (EBC) are the important marketing forms of natural rubber. RSS is graded into six grades on the basis of its quality, *i.e.* RSS 1X, RSS 1, RSS 2, RSS 3, RSS 4 and RSS 5. Rubber marketing structure of the state consists of three separate sectors *viz.* individual sector, co-operative sector and corporate sector. Rubber mark, RUBCO and RPSs are the three major players in the cooperative sector and their interventions in the market reduce the influence of middlemen ensuring more return to the producers.

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Introduction

India is the fourth largest producer of natural rubber with a share of 8.2% in world production in 2010. The production of natural rubber (NR) in the country was 8.31 lakh MT in 2009-10, registering a 3.8% decline compared to the previous year, while in 2010-11, natural rubber production of India increased to 8.62 lakh MT which marked an increase of 0.31 lakh MT over the previous period. Production of natural rubber for the year 2011-12 was projected at 9.02 lakh tonnes with a growth rate of 4.6%. Among the major natural rubber

consuming countries, India has second position after China, relegating United States and Japan to third and fourth position, with 8.8% share of total world consumption. The natural rubber consumption in the country has increased from 9.31 lakh MT in 2009-10 to 9.49 lakh MT in 2010-11 (Economic review, 2011). Consumption of NR in 2011-12 was projected at 9.77 lakh tonnes, an increase of 3.1% over the previous year. Despite not having geographically very favourable regions for growing NR, India continued to record the highest productivity among major NR producing countries (Economic survey, 2011-12).

Kerala is the major rubber producing state in the country. Rubber plantations have profound influence in economic and social life of people of Kerala. National institutes on rubber like Rubber Research Institute of India and Rubber Board are located in the state itself show the importance of the crop in the area. In this backdrop, a study has been conducted to analyse the existing economic scenario of natural rubber production and marketing in the state of Kerala.

Methodology

Rubber is an important crop as far as the agricultural economy of Kerala is concerned. The study was based on analysis of secondary data available from various official sources and also self-conducted market study. The time series data (1987-2010) on various aspects of rubber like state as well as district wise area, production and productivity were collected from different sources like Rubber Board, Farm Guide published by Farm Information Bureau, Government of Kerala, publications by Economics and Statistics Departments etc.

Cuddy-Della Valle Instability Index

Cuddy-Della Valle index was used to estimate the Kerala state level instability in total area, production and productivity.

$$II = CV (1 - R^2)^{0.5}$$

Where,

II = Instability index (per cent)

CV = Coefficient of variation (per cent)

R^2 = Coefficient of determination from a time trend regression adjusted by the number of degrees of freedom.

Trend analysis using index numbers

Index numbers were used to measure the trend in area, production as well as productivity of natural rubber in the state. Index numbers were worked out using the formula,

$$I_t = (P_t / P_0) 100$$

Where,

I_t = Index number

P_t = Current year value for the variable

P_0 = Base year value for the variable

The index numbers for area, production and productivity of natural rubber during 1987 to 2011 were worked out.

Compound Annual Growth Rate

Compound Annual Growth Rate (CAGR) was calculated by exponentially fitting time series data on total area, production, productivity against time using the below given formula,

$$Y_t = Y_0(1+r)^t$$

Taking natural logarithm of above equation, the formula is re-written as,

$$\begin{aligned} \ln Y_t &= \ln Y_0 + t \ln(1+r) \\ r &= (e^{b_2} - 1) 100 \end{aligned}$$

Where,

$$\ln Y_0 = b_1$$

$$\ln(1+r) = b_2$$

$$r = \text{CAGR}$$

Decomposition Analysis

Decomposition technique was used to measure the relative contribution of area, yield and their interaction effect to the production of natural rubber. Minhas' component analysis model was used for the purpose (Minhas, 1963). The output growth for the purpose of decomposition analysis was computed as the change in output of current period (taking average of the last three years) over the base period (taking average of first three years) for each time period.

Let P_0 and P_n be the production in the base year and n^{th} year respectively, they are given by,

$$P_0 = A_0 \times Y_0 \text{ and } P_n = A_n \times Y_n$$

Where, A_0 and A_n represent the area and Y_0 and Y_n represent the yield in the base year and n^{th} year respectively

$$P_n - P_0 = \Delta P, A_n - A_0 = \Delta A, Y_n - Y_0 = \Delta Y$$

From the above equations we can write,

$$\Delta P = A_0 \Delta Y + Y_0 \Delta A + \Delta A \Delta Y$$

i.e., Production = Yield Effect + Area Effect + Interaction Effect

Thus, the total change in production can be decomposed in to three effects, *viz.*, yield effect, area effect and the interaction effect due to the change in yield and area (Kalamkar *et al.*, 2002).

Results

1 Natural rubber production in Kerala

The coverage under the crop in 2010-11 was 5.34 lakh ha, higher by 8822 ha over the previous year. The production of natural rubber in Kerala during the year was 7.71 lakh tonnes, indicating 3.36% increase over the previous year. In 2010-11, the productivity increased slightly to 1442 kg/ha from 1419 kg/ha in the previous year. During the period, Kerala accounted for the 90% of the production of natural rubber in India. The productivity in Kerala was found to be less compared to the national average *i.e.*, 1419 against 1784 kg/ha, during 2009-10.

Table 1: District wise area and production of natural rubber in Kerala (2009- 2010)

Districts	Area (ha)	Contribution (%)	Production (tonnes)	Contribution (%)
Thiruvananthapuram	30449	6	42900	6
Kollam	36111	7	50830	7
Pathanamthitta	49957	10	77400	10
Alappuzha	4329	1	6580	1
Kottayam	112918	21	170800	23
Idukki	39679	8	54600	7
Ernakulam	58729	11	90770	12
Thrissur	15017	3	21800	3
Palakkad	35559	7	47930	6
Malappuram	38136	7	48080	6
Kozhikode	20358	4	28275	4
Wayanad	9723	2	8400	1
Kannur	43819	8	58125	8
Kasaragod	30624	6	39020	5
Total	525408	100	745510	100

Source: Farm Guide, 2012

In Kerala, around 40 per cent of the area as well as 45 per cent of production of rubber comes from three districts *i.e.*, Kottayam, Ernakulam and Pathanamthitta. The district wise area and production details are presented in Table-1.

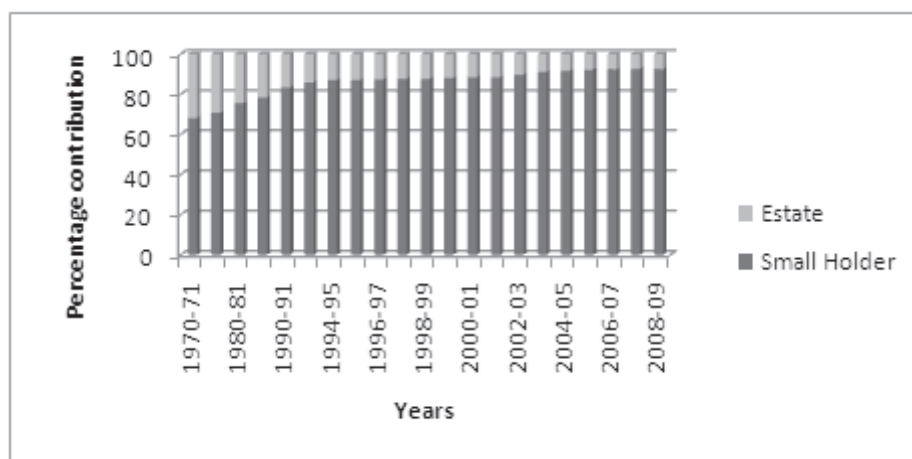


Fig. 1: Production system wise percentage contribution of natural rubber in Kerala

Table 2: Production system wise contribution of natural rubber in Kerala

Year	Production (Tonnes)		Contribution (%)	
	Small holder	Estate	Small holder	Estate
1970-71	86773	40633	68.11	31.89
1975-76	128769	53134	70.79	29.21
1980-81	140320	45400	75.55	24.45
1985-86	184563	50792	78.42	21.58
1990-91	307521	61115	83.42	16.58
1993-94	408311	67210	85.87	14.13
1994-95	442830	65915	87.04	12.96
1995-96	474555	70410	87.08	12.92
1996-97	512756	74425	87.33	12.67
1997-98	541935	76830	87.58	12.42
1998-99	559099	78045	87.75	12.25
1999-00	572820	77665	88.06	11.94
2000-01	579866	76635	88.33	11.67
2001-02	580970	76080	88.42	11.58
2002-03	596737	69355	89.59	10.41
2003-04	657024	64555	91.05	8.95
2004-05	696513	64070	91.58	8.42
2005-06	742845	63095	92.17	7.83
2006-07	780945	63090	92.53	7.47
2007-08	754065	60670	92.55	7.45
2008-09	737605	59550	92.53	7.47

Source: Rubber Board

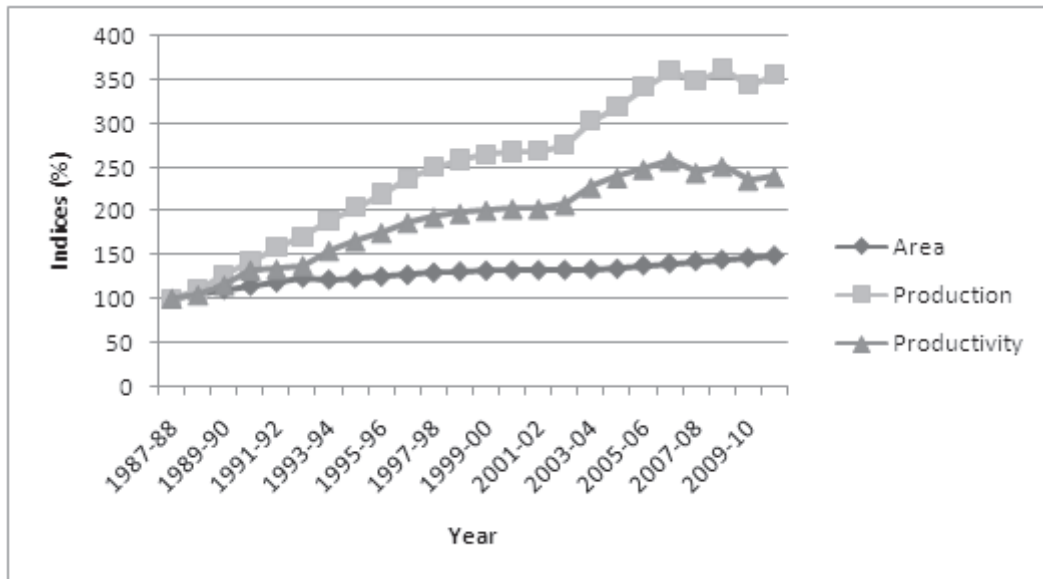


Fig. 2: Trends in indices of area, production and productivity of NR in Kerala

The relative share of small holder production system and estate production system to the total production of the state is presented in Table-2. There was a steady declining trend in the contribution of estates for the last three decades and now their contribution is around 7 per cent only (Figure-1).

Trends in natural rubber production

The production of NR was contributed by the factors of area and yield. The area, production and productivity of NR in Kerala were showing a steady increasing trend for the last few decades. The trend in area, production and productivity of natural rubber for the last 25 years is presented in Table-3 and explained with Figure-2. Trend analysis using index numbers showed that over a period of last 25 years, the area under rubber and its productivity increased to an extent of 46 per cent and 135 per cent respectively and resulted in 244 per cent rise in NR production in Kerala. There was a decrease in the pace of growth during the period from 1999 to 2003, but after that growth gained the acceleration again and for the last three years it was consistent. The trend analysis showed that there was a sudden jump in the production as well as productivity during 2002-2003. This was mainly due to the better agro management scientific practices adopted by the farmers under the expert guidance of Rubber Board, rather than influence of high yielding varieties.

Table 3: Area, production and productivity of NR in Kerala with indices

Year	Area (ha)	Indices	Production (Tonnes)	Indices	Productivity (kg/ha)	Indices
1987-88	358960	100	216560	100	603	100
1988-89	379670	105.77	238410	110.09	628	104.15
1989-90	396470	110.45	275400	127.17	694	115.09
1990-91	411620	114.67	307520	142.00	800	132.67
1991-92	425770	118.61	343110	158.44	806	133.67
1992-93	444100	123.72	368650	170.23	830	137.65
1993-94	437140	121.78	408310	188.54	934	154.89
1994-95	443300	123.50	442830	204.48	999	165.67
1995-96	449000	125.08	474560	219.14	1057	175.29
1996-97	455570	126.91	512760	236.78	1126	186.73
1997-98	465280	129.62	541940	250.25	1165	193.20
1998-99	469920	130.91	559100	258.17	1190	197.35
1999-00	472900	131.74	572800	264.50	1211	200.83
2000-01	474360	132.15	579870	267.76	1222	202.65
2001-02	475040	132.33	580350	267.99	1222	202.65
2002-03	476040	132.62	594920	274.71	1250	207.30
2003-04	478400	133.27	655130	302.52	1369	227.03
2004-05	480660	133.90	690780	318.98	1437	238.31
2005-06	494400	137.73	739230	341.35	1495	247.93
2006-07	502240	139.92	780410	360.37	1554	257.71
2007-08	512045	142.65	753135	347.78	1471	243.95
2008-09	517475	144.16	783485	361.79	1514	251.08
2009-10	525408	146.37	745510	344.25	1419	235.32
2010-11	534230	148.82	770580	355.83	1442	239.14

Source: Farm Guide, 2012

Instability and growth in area, production and productivity

The compound growth rate and instability index of area, production and productivity of natural rubber in Kerala for the last 25 years (1987-2011) are presented in Table-4. The annual growth rate during the period is presented in Figure-3. The NR production in Kerala grew annually by 5.40 per cent and was contributed more by growth in productivity (3.95%) than in area (1.36%). The instability in area, production and productivity during the period were 2.56, 5.84 and 6.37 per cent respectively.

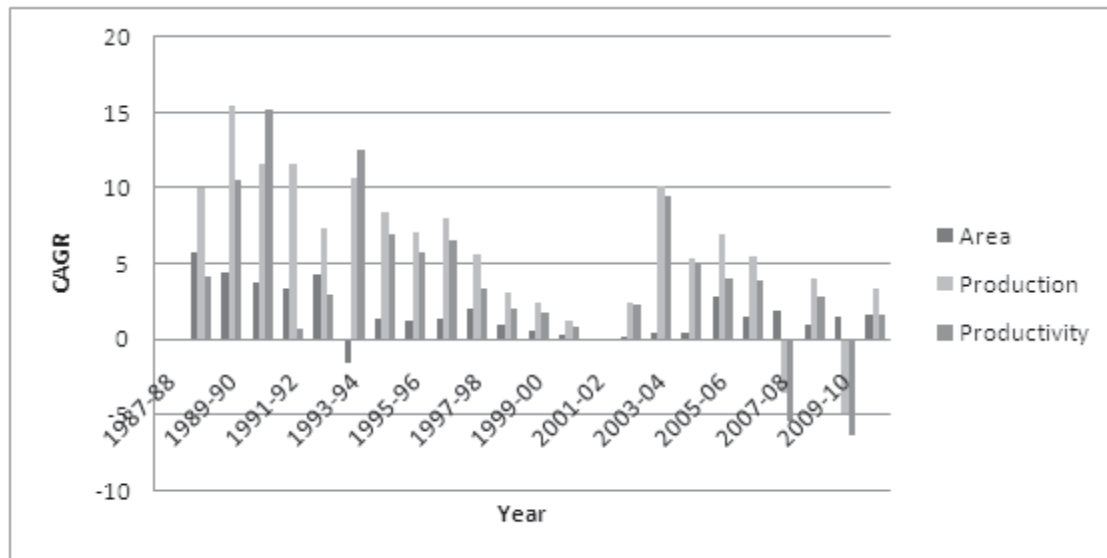


Fig. 3: Annual growth rate of area, production and productivity of NR in Kerala

Table 4: CGR and instability index of area, production and productivity (in %)

	Area		Production		Productivity	
	CGR	Instability	CGR	Instability	CGR	Instability
Kerala	1.36	2.56	5.40	5.84	3.95	6.37

Decomposition Analysis

The result of the decomposition analysis is presented in Table-5. The analysis showed that the yield effect is contributing nearly two fold to the total production compared to the area effect. The yield effect was contributing 54.36% against 19.1% area effect, whereas 26.54% of the growth was contributed by the interaction effect.

Table 5: Decomposition analysis of natural rubber production in Kerala (1987-2011) in MT

Change in production (1987-2011)	Yield Effect	Area Effect	Interaction Effect
553799	301060	105740	147000
Percentage contribution	54.36	19.1	26.54

Natural rubber marketing in Kerala

Marketable forms of natural rubber

Rubber is considered as the modern “*Kalpa vriksha*”, *i.e.*, a tree with every part of it being useful and of economic importance. Besides yielding rubber, which is of most versatile application, the tree is an important source of timber, honey, rubber seed and oilcake. Latex is obtained from the bark of the tree by tapping.

Ribbed smoked sheet (RSS), Latex concentrates (LC), Technically Specified Rubber (TSR), Pale Latex Crepe (PLC) and Estate Brown Crepe (EBC) are the important marketing forms of natural rubber. Ribbed Smoked Sheet (RSS) is the common method of processing latex. It is graded into six on the basis of its quality. They are RSS 1X, RSS 1, RSS 2, RSS 3, RSS 4 and RSS 5. Usually RSS 1X, RSS 1, 2, and 3 are produced by estate holders and are considered as the best quality of NR. Small holders produce low grade rubber *i.e.*, RSS 4 or RSS 5. It is marketed as an ungraded lot rubber consisting of a mixture of RSS 4 and 5. Latex concentrates are generally marketed in two forms *viz.* centrifuged latex having a dry rubber contents (DRC) of 60 % and Creamed latex having a DRC of 55 %.

TSR is produced in blocks of convenient size, out of latex in order to satisfy the specific requirements of Rubber Goods Manufacturers. Bureau of Indian Standards (BIS) prescribes six grades of block rubber *viz.* ISNR 3CV, ISNR 3L, ISNR 5, ISNR 10, ISNR 20, and ISNR 50. Pale Latex Crepe (PLC) is processed from pure latex and fetches a higher price than RSS 4 in the Indian rubber market. It is mainly used for the production of foot wears. Estate Brown Crepe (EBC) is processed from field coagulum (FC) and it is consumed by the tyre companies. The individual grower or processor selects a particular form of NR for its production on the basis of technical know-how, potential demand, expected production, investment capacity, price and profitability.

Marketing system

Natural rubber marketing system represents the entire activities aiding the movement of rubber from the primary producers to the end-consumers. It has evolved through the process of undergoing changes and modifications in the structural features of production and consumption, market orientation and the government intervention in the rubber market.

Rubber marketing structure of the state consists of three separate sectors *viz.* individual sector, co-operative sector and corporate sector. The individual sector consists of rubber dealers, brokers, commission and forwarding agents. The co-operative sector includes Co-operative Rubber Marketing Societies (Rubber Mark), Rubber Producers’ Societies and Kerala State Rubber Co-operative Ltd. (RUBCO). Under the corporate sector, the big tyre companies operate their purchasing depots at the main producing centres to collect rubber directly from the growers.

Marketing Channels

The product mix of small rubber growers includes ribbed smoked sheet (RSS), latex and field coagulum (FC). The channels used for marketing these products are represented as Figure-4. Large plantation companies have their own infrastructure facilities for processing different types and grades of rubber in accordance with market demands. Small and medium estates have the facilities to process only sheet rubber and FC and latex are sold as such. They sell sheet rubber either to manufacturers directly or to terminal dealers in Kottayam or Kochi markets.

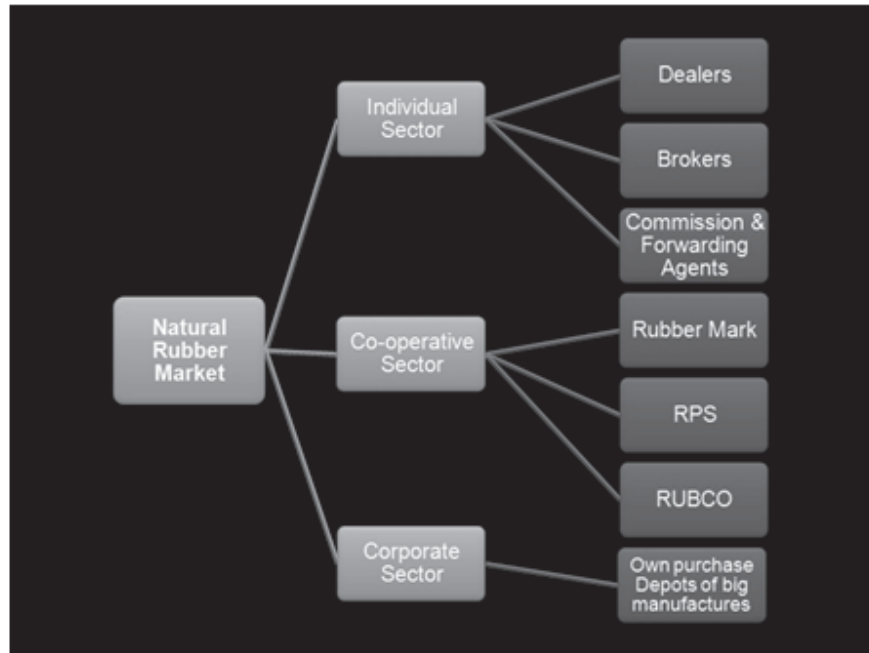


Figure 4: Marketing system of natural rubber producers in Kerala

Discussion

Rubber plantations occupy 0.4 per cent of the gross cropped area in India, and accounts for 0.19 per cent of the country’s GDP. Kerala occupies a monopolist position in the production of natural rubber in India with a share of 90 per cent of total production and 78 per cent of the total area under cultivation in the country. Rubber is the fast growing agricultural sector in the state and the growth rate is higher compared to other agricultural commodities. The advantage of Kerala in rubber production is that, the cultivation of natural rubber for the first time in the country in large scale was started in the state. The progressive responses of a highly receptive farming community to research and development initiatives and the concomitant performance of the sector also contributed to the growth of the sector. The explicit contributory factors for the sustained growth of the sector are reported to be a comparatively stable and remunerative pricing *vis-a-vis* other crops in the state (Chandy *et al.*, 2009). The productivity of natural rubber in Kerala is lower compared to the national average and this can be understood with the fact that the farmers of Kerala are following the cultivation traditionally, whereas in other parts of the country, they started the plantations recently with high

yielding, highly resistant varieties with good management scientific practices under institutional guidance.

In the state of Kerala itself the production is concentrated in few regions. The Kottayam district had an annual contribution of 170800 tonnes (23 %) during 2009-10, followed by Ernakulam (90770, 12 %) and Pathanamthitta (77400 tonnes, 10 %). These three districts contributed 45 % of the total rubber production of the state and 40 % of total area under cultivation. This accumulation might be due to the historical reason of starting of rubber plantations in these regions for the first time and the subsequent market development in and around this area and experience gaining, promoting the acceptance of this by more and more people within the region as a livelihood measure with better returns. The contribution of the estate holders is also declining in the total production with increased small holder contribution. The contribution of estate type during 1970-71 was 32 % and came down to around 7 % by 2008-09. This should be correlated with the overall turn down in the estate type plantations like tea and rubber, due to the non-availability of sufficient labour force and the transformation of people in to self-responsible and entrepreneurship type jobs.

The trend analysis for the last 25 years revealed that natural rubber production in Kerala increased by 244 %, area by 46 % and the productivity by 135 %. There was a slowdown in the pace of growth during 1999 to 2003, because during the period, there was sharp decline in the price of natural rubber and the people were reluctant to expand the cultivation due to lower earnings. But after this period, the growth regained the momentum and now moving in an accelerated fashion.

The compound growth rate for the period from 1987-2011 showed that the production increased by 5.40 % and this was contributed more by productivity (3.95 %) rather than area (1.36 %). The instability index showed that there was high instability in case of productivity during the period.

Conclusion

Natural rubber production of India is mainly concentrated in Kerala. Over the years area, production and productivity of natural rubber of the state showing an increasing trend. Production system wise analysis showed that contribution of Estate holders was showing a declining trend over the years. The decomposition analysis showed that the yield effect is contributing two fold to the total production compared to the area effect. Individual sector, cooperative sector and corporate sector together constitute the natural rubber marketing system of the state.

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