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Performance Appraisal of Indian Agricultural System with special reference to Agricultural Scenario in the State of Kerala

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***Abstract*:** *Agriculture is making highest contribution to India's GDP and occupies a prominent position in Indian policy-making not only because of its contribution to GDP but also because of the large proportion of the population dependent on this sector for its livelihood. This paper focuses on recent trends in Indian agricultural system with special reference to kerala state and compares the agriculture in India with rest of the world in terms of area, production and yield. It also analyze the productivity and yield of major agricultural crops of Kerala and identify the cropping intensity and agricultural workers' participation in the State. It was concluded that a paradigm shift is required to transform the traditional system of agriculture to a modern sector through the adoption of science-based technology, thereby enhancing quality and quantity of agricultural commodities and services with social enhancements. Self reliance in the matter of food should be the chief focus in order to ensure food security and tackle the rising prices of food commodities in the State.*

***Keywords**: agricultural crops, productivity, self reliance, food security*

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I. Introduction

In India, agriculture and allied sector have a mainstay as its share in employment and livelihood creation is incredibly high. It is the chief source of livelihood for more than 58% of the population and is the essence of growth of Indian economy, accounting for 14% of the nation's Gross Domestic Product (GDP). Agro sector also contributes to about 11% of the country's exports; almost half of the population still relies on agriculture as a principal source of income and is also the major source of raw material for a large number of industries. Accelerating the growth of agriculture production is therefore the foremost focus so as to achieve an overall GDP target of 8% during the 12^{th} Plan and meet the intensifying demand for food. Growth of agro based sectors in the country is also necessary to ensure an inclusive growth throughout by streamlining the backward and rural population towards the path of development and thereby increasing the incomes of those dependent on agriculture (Ministry of Agriculture, Government of India, 2012-13).

Indian agriculture predominantly follows a mixed crop-livestock farming system. The livestock segment supplements farm income by increasing employment opportunities in farms and related agro based industry and service sectors, it also provides draught animals, supplies manure and so on. India ranks first in milk production, accounting for 17% of world production thus becoming an important secondary source of income for 70 million rural households engaged in dairying. Agro based food processing industry is the fastest growing agribusiness in the country. Agriculture and food sector needs huge investment in research and development, agricultural education, extension programmes, irrigation, fertilizers, laboratories to test soil, water and commodities, warehousing and cold storage systems. The major concerns raised in Indian agricultural system have been on the non-sustainability of the present cropping pattern, unsatisfactory management of water and soil resources, poor disaster management, use of obsolete technology and also owing to unskilled farmers to handle innovative farming. There are wide gap in the yields of various agricultural commodities among the different Indian States. The yield gap between India and rest of the world with respect to agro based production and distribution also need to be bridged if swift growth and development is to be ensured.

II. Review Of Literature

An effervescent growth of agriculture sector is indispensable for meeting the wage goods requirements for faster growth. It is an important source of raw material and demand for many industrial products, particularly fertilizers, pesticides, agricultural implements and a variety of consumer goods, (National Statistical Commission, 2013). Agriculture is a fundamental link in the supply chain of the manufacturing sector and plays a key role in the rural development of the country. It is also imperative for meeting the food and nutritional security of the people especially in the backward sectors of the economy. Agro based activities facilitate an equitable distribution of income and wealth in rural areas as well as helps in reducing poverty and improving the

quality of life of people in the economy. Growth in agriculture has a maximum cascading impact on other sectors, leading to the multiplying effects of benefits over the entire economy and on the largest segment of population (National Statistical Commission, 2013).

According to the studies conducted by Indian Brand Equity Foundation (IBEF) (2013) the agriculture sector is a major segment of the Indian economy that supports about 50% of India's workforce and occupies more than one third of the country's total geographical area. It is the single largest contributor to the Indian economy inspite of the fact that its contribution to GDP has been declining since independence. The major agricultural crops produced in India include rice, coarse cereals, pulses, oilseeds, sugarcane, cotton, jute and mesta. The report also states that over the past five years, the agriculture sector has seen significant increase in production of food grains, oil seeds commercialised crops, fruits, vegetables, poultry and dairy. Overall, agriculture and agri based products have become the largest consumption category in India. Above all India is the leading re-exporters of cashews and spices as well as one of the major producers of milk in the world. Factors that are expected to drive growth in the future comprises of smooth functioning of extension systems by ramping up of skilled workforce to fill in vacant positions, dissemination of technologically advanced crops among farmers, focus on water management systems, penetration of technologically superior variant crops, management of soil nutrients, extension of agricultural credit etc.

Tyagi (2012) in the study observed that agriculture is the backbone of Indian economy as this sector has vital supply and demand links with the manufacturing sector. During the past five years India's agriculture sector has witnessed tremendous growth in the production and productivity of food grains, commercial crops, oilseeds, fruits and vegetables, poultry and dairy farming. India has emerged as the second largest producer of fruits and vegetables in the world in addition to being the largest overseas exporter of cashews and spices. The country is also the forerunner in milk production worldwide. The green revolution and associated revitalisation in the agro sector massively increased the production of vital food grains and introduced technological innovations into Indian agriculture. This progress is manifested in India's net trade position. India once essentially considered as dependent on imports to feed its people, since 1990 has become an important exporter of different agro-food products of the world. Indian agricultural system is quite huge and diverse and its sheer size means that even minor changes in its trade have significant impacts on world agricultural markets.

Birthal, Joshi, Roy and Thorat (2007) in their research observed that agricultural diversification towards high-value crops can potentially amplify farm incomes, especially in a country like India where demand for high-value food products has been mounting rapidly than that for staple crops. Horticulture, floriculture, dairy farming, livestock management etc are increasingly becoming popular and earning higher income to agro sector. One of the main channels through which diversification towards high-value added crops can reduce poverty is through the participation of small farm holders. The study reflected that small farm holders showed more participation in high-value fruit and vegetable production compared to larger farms. The high capital intensity and greater gestation lags in fruits seem to be the restricting force for small farmers having a minimal capital and a low appetite for the riskier fruit market. Given that agriculture is providing higher labour endowments in India with predominance of smallholders, the share of resources allocated to high-value agriculture continues to be relatively small, although it is increasing over time.

Mahesh (2000) in the research elaborates on implementation of land reforms and states that the agricultural sector in Kerala has undergone extensive changes in terms of farm size, cropping pattern, cultivation practices and productivity. There has been a phenomenal development in the number of agricultural holdings leading to the materialization of immense number of very small holdings. The study examined whether the increase in productivity of land can be explained by the decrease in the size of holdings. It was verified through a sample survey conducted in a rural locality of Kerala. A size-wise analysis of productivity reflected that the larger farms have higher productivity. However, more detailed analysis using regression methods shows that no firm relationship exists between farm size and productivity. An in-depth analysis to identify the causal factors of productivity was made and the preposition that those cultivators having non-farm sources of income have more access to resource for farm expenditure than cultivators whose sole source is cultivation was not found true in the observed data. The preposition that farms employing family labour achieve productivity higher than of farms employing only hired labour also did not provide any conclusive evidence. However, the survey data indicated an association between crop mix and productivity.

Objectives of the Study

1. To examine the recent trends in Indian agricultural system.
2. To compare agriculture in India with rest of the world in terms of area, production and yield.
3. To analyse the productivity and yield of major agricultural crops of Kerala.
4. To identify the cropping intensity and agricultural workers' participation in the State.

A Global Comparison of Agricultural Scenario

A global comparison of principal crops with respect to area, production and yield during 2012 is depicted in Table: 1. The table reveals that in terms of production percentage of paddy and wheat China is the leading nation in the world. They are second largest producers of maize and third largest in the sugarcane production. India's agriculture share in the world depicts that it is the second largest producer of paddy, wheat and sugarcane and is sixth largest in terms of production of maize. Yield of paddy and wheat per hectare also reveals that China and India are forerunners, however in the case of yield of maize and sugarcane USA and Brazil are in the foremost position. In terms of area utilised for agriculture, maize followed by paddy and wheat occupies a major share of area.

Table: 1 Global Comparison of Area, Production and Yield of Principal Crops (2012)

Country	Area (M. Hectare)	Production (M. Tonnes)	Yield (Tonnes/ Hectare)	Production (%)
1. Paddy				
World	163.46	718.35	4.39	100.00
China	30.56	206.09	6.74	28.69
India	42.50	152.60	3.59	21.24
Indonesia	13.44	69.05	5.14	9.61
Bangladesh	11.70	34.20	2.92	4.76
Vietnam	7.75	43.66	5.63	6.08
2. Wheat				
World	216.64	674.88	3.12	100.00
China	24.14	120.58	5.00	17.87
India	29.90	94.88	3.17	14.06
Russian Federation	21.28	37.72	1.77	5.59
USA	19.83	61.76	3.11	9.15
3. Maize				
World	176.99	875.10	4.94	100.00
USA	35.36	273.83	7.74	31.29
China	34.97	208.26	5.96	23.80
Brazil	14.23	71.30	5.01	8.15
Mexico	6.92	22.07	3.19	2.52
Indonesia	3.96	19.38	4.89	2.21
India	8.40	21.06	2.51	2.41
4. Sugarcane				
World	25.76	1773.81	68.85	100.00
Brazil	9.41	670.76	71.30	37.81
India	5.09	347.87	68.34	19.61
China	1.80	124.17	68.81	7.00
Thailand	1.30	96.50	74.23	5.44
Pakistan	1.05	58.04	55.49	3.27

Source: *Director General of Commerce Intelligence & Statistics, Ministry of Commerce, Kolkata*

State of Affairs of Indian Agriculture in the Recent Years

India is the second largest highly populated country in the world and the nation is striving to discover novel ways and means to keep its burgeoning population adequately fed. India basically being an agrarian economy is having hindrances in the form of declining productivity and also faces challenges posed by liberalisation. Major crops cultivated in the country includes rice, wheat, sugarcane, oilseeds, pulses, cotton, jowar, bajra, ragi, tea, coffee, coconut, cashew, rubber, spices, cauliflower, onion, cabbage, mango, banana, sapota, etc. Small and marginal operational holding is the main characteristics of Indian agricultural system. It is found that about 85% of total cultivated land has been fragmented into less than 10 hectare land and about 60% of farmland is less than 4 hectare in size. In present agricultural scenario proper leveraging of available natural resources and harmonising it with the existing infrastructure to build agro system of the nation is the need of the day. Knowledge of the existing infrastructure, natural resources, utilising them effectively and in a sustainable manner through appropriate strategies and agricultural engineering can enable it to meet the growing demands and meet the challenges posed by various human and environmental factors. Serious efforts to develop technologies for enhancing productivity and reducing the cost of cultivation can facilitate in witnessing spectacular advancements in the production, yield of principal crops and other agro based activities in the country.

Table: 2 shows the result of major crops produced in India during the last five years extending from 2009-10 to 2013-14. The findings reflects an increasing trend of production of food grains, cereals, pulses, rice, wheat, oil seeds, sugarcane, cotton and potatoes over the period of last five years. Table: 3 depicts the yield per hectare of major crops in India from 2009-10 to 2013-14. It manifests that the yield per hectare of commodities like food grains, cereals, pulses rice, wheat and oil seeds showing a more or less positive rising trend over the

four years from 2009-10 to 2012-13 with slight dip in the year 2013-14. Cotton yield shows steady increase till the year 2011-12, then slightly drops during the year 2012-13 and further escalates during the period 2013-14. In the case of sugarcane the yield over last five years was stable whereas, yield per hectare of potatoes reflects a fluctuating trend.

Table: 2 Production of Major Crops in India (Million Tonnes)

Sl. No	Commodity	2009-10	2010-11	2011-12	2012-13	2013-14*
1	Food Grains	218.1	244.5	259.3	257.1	264.8
2	Cereals	203.4	226.3	240.8	238.8	245.5
3	Pulses	14.7	18.2	17.1	18.3	19.3
4	Rice	89.1	96.0	105.3	105.2	106.5
5	Wheat	80.8	86.9	93.5	93.5	95.9
6	Oil Seeds	24.9	32.5	29.8	30.9	32.9
7	Sugarcane	292.3	342.4	361.0	341.2	350.0
8	Cotton	24.0	33.0	35.2	34.2	36.7
9	Potato	36.6	42.3	46.6	45.3	41.5

Source: *Directorate of Economics & Statistics, Department of Agriculture and Cooperation.*
** Advance Estimates*

Table: 3 Yield per Hectare of Major Crops in India (Kg / Hectare)

Sl. No	Commodity	2009-10	2010-11	2011-12	2012-13	2013-14*
1	Food Grains	1798	1930	2078	2128	2101
2	Cereals	2075	2256	2401	2449	2435
3	Pulses	630	691	699	789	764
4	Rice	2125	2239	2393	2462	2424
5	Wheat	2839	2989	3131	3117	3075
6	Oil Seeds	958	1193	1133	1168	1153
7	Sugarcane	70	70	70	70	70
8	Cotton	403	499	491	486	532
9	Potato	20	23	25	22	21

Source: *Directorate of Economics & Statistics, Department of Agriculture and Cooperation.*
** Advance Estimates*

Table: 4 reflects Indian agricultural scene during the three years extending from 2011-12 to 2013-14. As per the new series of national income released by the Central Statistical Organisation (CSO) in 2011-12 the share of agriculture and allied sector in total GDP was 18.4%, during 2012-13 and 2013-14 it was 18% each respectively. Among the various agriculture items, crops are the leading contributors followed by livestock, forestry and logging and finally fishing. The share of agriculture and allied sector in Gross Capital Formation (GCF) shows that the percentage contributions were 8.6%, 7.7% and 7.9% respectively during the years 2011-12, 2012-13 and 2013-14. With respect to GCF in and allied sector (current prices 2011-12 prices) the contributions were 18.3%, 15.3% and 14.8% in the three years extending from 2011-12 to 2013-14.

Table: 4 An Overview of Agricultural Sector in India

Sl. No	Item	2011-12	2012-13	2013-14
1	Growth in GDP in agriculture & allied sectors	----	1.2	3.7
	Share of agriculture & allied sectors in total GDP	18.4	18.0	18.0
	Crops	12.0	11.7	11.8
	Livestock	4.0	4.0	3.9
	Forestry and Logging	1.6	1.5	1.4
	Fishing	0.8	0.8	0.9
2	Share of agriculture & allied Sectors in total GCF	8.6	7.7	7.9
	Crops	7.4	6.5	6.6
	Livestock	0.8	0.7	0.7
	Forestry and Logging	0.1	0.1	0.1
	Fishing	0.4	0.4	0.5
3	GCF in agriculture & allied Sectors as per cent to GDP of the sector (at current 2011-12 prices)	18.3	15.5	14.8

Source: CSO.

Agricultural Background in Kerala

Kerala is the southernmost State in India characterised by the resource richness such as rainfall, fertile soil, good sunshine and humidity. The State has diverse climatic conditions ranging from tropic, sub tropic to semi temperate climate and is divided into 26 different agro ecological zones. Kerala's geographical area extending along the Western Ghats is well known for its flora and fauna diversity and is popular as the 'Biodiversity Paradise'. Inspite of these factors agriculture in Kerala is suffering from obstacles like declining

cultivable area, low productivity per unit of labour, prevalence of tiny and fragmented holdings. Being a State with nearly cent percent literacy and greater percentage of highly educated youth, agricultural system in Kerala is facing the problems of young generation preferring white collar jobs, thereby resulting in the aversion of agriculture sector. Young farmers and agricultural labourers due to the insecurity in income, uncertainty in agricultural production and poor marketing channels are also neglecting this sector.

Agriculture and allied sectors is one of the crucial sectors of the Kerala economy as they provide source of livelihood to about two-third of the population and contribute a fourth of the State Domestic Product (SDP). According to the studies conducted by Government of Kerala, it is found that the emergence of export-oriented cash crops over food crops as resulted in the fall of food crop to non food crop area ratio from 64:36 in 1960-61 to 16:67 during 2009-10. The impact of climate variations affected the agricultural production and yield to a great extent in the form of flood and drought. The studies also indicated that 80% of the agricultural products like rubber, tea, coffee, and spices produced from Kerala still continue to be marketed outside the State. The presence of lush greenery in the State gives better scope for feed availability to the livestock and thus forms an integral part of the agro production system. The integrated farming by harmonising livestock, backyard poultry and inland fishery is known as the homestead farming which is unique to Kerala (Government of Kerala, 2013).

There is a common consensus that the role of agriculture in the overall economy has been diminishes with rapid economic growth and shift of focus to service sectors. Kerala like other Indian States is no exception as it has also seen a plunge in the contribution of agriculture and allied services to the overall Gross State Domestic Product (GSDP) from about 30% in 1990−91 to 10.6 % during the year 2010−11. Agriculture in Kerala has passed through changing scenarios with the major transformation starting from the later part of 1970's. There was a decline in rice production in Kerala during late 1970's as a result of increased availability of rice grains at a relatively cheaper price. Subsequently, investment in rice production declined and a major portion of the land was shifted for the cultivation of perennial tree crops and seasonal crops. Profitability of crops is reducing due to the demand for higher wages by farm labourers, rising price of land and uneconomic size of operational holding areas. High density of population and consequent pressure on land is increasing rapidly making farming in the State a non profitable vocation.

Another feature of Kerala is that it is basically a consumer State that is primarily dependent on Tamil Nadu, Karnataka and Andhra Pradesh for the staple food, rice. Kerala is not self reliant in terms of food production, causing a high level of food insecurity in the State. Price escalation with non availability of food in the region is a grave concern of the State as this may lead to the control of free flow of food grains. Land available for cultivation is shrinking day by day due to increasing urbanisation, decline in agricultural growth coupled with declining profitability in the agriculture sector. Many grain producing areas of the State has declared 'Rice Holidays' making the situations even worse. Technological backwardness, focus on tourism and other service sectors ignoring agriculture, labour unrest, poor disaster management facilities and lack of proper support from the government in protecting farmers' interests are the main hindrances faced by the agricultural producers and distributors in the State (Government of Kerala, Agricultural Development Policy (Draft), 2013).
Nevertheless, agro based system has been redefined due to new global phenomena like globalisation, materialisation of integrated value chains, rapid technological and institutional innovations, emergence of livelihood and food security issues and environmental constraints. A paradigm shift is required to transform the traditional system of agriculture to a modern sector through the adoption of science-based technology, thereby enhancing quality and quantity of agricultural commodities and services with social enhancements. For ensuring inclusive, sustainable and overall growth and development of Indian agrarian system the main pre requisite is therefore, a major shift from the conventional agriculture to a modern and hi tech farming and non farming activities to boost the performances.

Performance of Kerala Agricultural Sector

The agriculture sector in Kerala is witnessing a gradual transformation the cropping pattern of Kerala for the year 2012-13 is depicted in Table: 5.

Table: 5 Cropping Pattern of Kerala for the Year 2012-13

Total cropped area	26,16,670 Ha
Net area sown	20,50,994 Ha
Area sown more than once	5,65,676 Ha
Net area irrigated (source wise)	3,97,176 Ha
Net area irrigated (source wise) to area sown	19.36%
Irrigated paddy area to total paddy area	77.16%
Cropping intensity	127.58%

Source: *Agricultural Statistics 2013-14, Department of Economics and Statistics Kerala.*

Table: 6 indicates the production of principal crops in Kerala for the years from 2007-08 to 2011-12. Principal crops cultivated in Kerala include rice, tapioca, cashew, rubber, arecanut, coconut, banana, tea, coffee, pepper, ginger, sugarcane and cotton. Commodities like rice, ginger, banana, tapioca, coconut, arecanut, tea,

coffee and rubber is showing a rising trend over a period of five years extending from 2007-08 to 2011-12. However, cotton production in the State is showing a declining trend over the period of five years.

Table: 7 reflects the State level estimates of gross cropped area, net cropped area and cropping intensity from 2001-02 to 2013-14. The figures show that cropping intensity in the State during 2001-02 was 136.59 later during 2005-06 it increased upto 139.97. Then started declining gradually in the subsequent years and reached upto 127.58 in the year 2013-14.

Table: 6 Production of Principal Crops in Kerala for the Years from 2007-08 to 2011-12 *Production in Tonnes*

Sl. No	Crops	2007-08	2008-09	2009-10	2010-11	2011-12
1	Rice	528488	590241	598339	522738	568993
2	Sugarcane	15915	27548	28497	27184	26303
3	Black Pepper	41952	33991	42459	54267	37989
4	Dry Ginger	31726	30809	28603	33197	37130
5	Banana	439803	435979	406242	483667	514054
6	Tapioca	2556455	2712114	2525384	2408962	2567953
7	Cashew	52402	42334	35818	34752	36743
8	Coconut	5641	5802	5667	5287	5941
9	Arecanut	114690	125654	116763	99909	121623
10	Tea	51754	51726	57810	57291	57904
11	Coffee	48650	57200	59820	65650	68175
12	Rubber	753135	783485	745510	770580	798940
13	Cotton	1680	1498	1324	731	640

Source: *Department of Economics and Statistics, Government of Kerala, 2013*

Table: 7 State Level Estimates of Gross Cropped Area, Net Cropped Area and Cropping Intensity from 2001-02 to 2013-14

Sl No.	Year	Gross Cropped Area (Ha)	Net Cropped Area (Ha)	Cropping Intensity
1	2001-02	2992252	2190690	136.59
2	2002-03	2970384	2188537	135.72
3	2003-04	2954454	2189940	134.91
4	2004-05	2994666	2154885	138.97
5	2005-06	2982454	2132483	139.86
6	2006-07	2913873	2101431	138.66
7	2007-08	2758740	2089029	132.06
8	2008-08	2694943	2088955	129.01
9	2009-10	2668678	2078715	128.38
10	2010-11	2647461	2071507	127.80
11	2011-12	2661757	2040132	130.47
12	2012-13	2591734	2048109	126.54
13	2013-14	2616670	2050994	127.58

Source: *Agricultural Statistics 2013-14, Department of Economics and Statistics Kerala.*

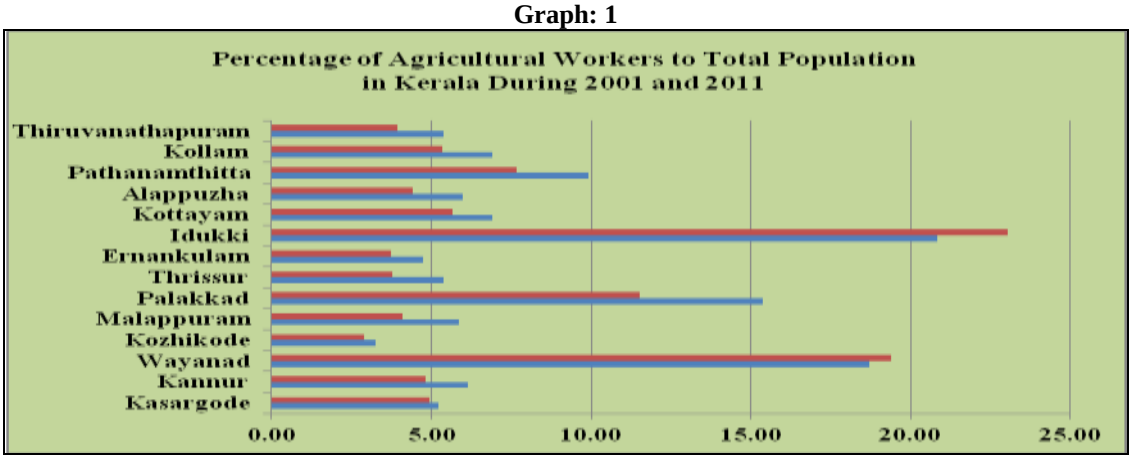
Table: 8 exhibits the percentage of agricultural workers in the total population in each districts of the State. It is evident from the result that in 2001, Idukki, Wayanad and Palakkad districts of Kerala has the highest percentage of agricultural workers out of total population and it was 20.81%, 18.69% and 15.39% respectively. During 2011 this percentage was 23.04, 19.39 and 11.54 for Idukki, Wayanad and Palakkad districts respectively. The least percentage of agricultural workers out of the total population is seen in Kozhikode districts in both the years studied.

Table: 8 Agricultural Workers in Kerala in Percentage out of Total Population

Sl. No.	District	2001	2011
1	Kasargode	5.22	4.96
2	Kannur	6.13	4.82
3	Wayanad	18.69	19.39
4	Kozhikode	3.26	2.88
5	Malappuram	5.88	4.11
6	Palakkad	15.39	11.54
7	Thrissur	5.37	3.78
8	Ernankulam	4.76	3.73
9	Idukki	20.81	23.04
10	Kottayam	6.92	5.67
11	Alapuzha	6.00	4.42
12	Pathanamthitta	9.90	7.68
13	Kollam	6.90	5.35
14	Thiruvananthapuram	5.38	3.92

Source: *Census 2001 and 2011*

Graph: 1



III. Conclusion

Agriculture is making highest contribution to India's GDP and occupies a prominent position in Indian policy-making not only because of its contribution to GDP but also because of the large proportion of the population dependent on this sector for its livelihood. The green revolution massively increased the production of vital food grains and introduced technological innovations into agro sector bringing buoyancy in agricultural business arena. This progress is manifested in India's net trade position, India once dependent on imports to feed its people, since 1990 it is a net exporter of major agricultural commodities of the world. Kerala basically being a consumer State is primarily dependent on Tamil Nadu, Karnataka and Andhra Pradesh for the staple food, rice. Kerala with nearly cent percent literacy and greater percentage of highly educated youth, agriculture system in the State is facing the problems of young generation preferring white collar jobs, thereby resulting in the aversion of agriculture sector. Young farmers and agricultural labourers due to the insecurity in income, uncertainty in agricultural production and poor marketing channels are neglecting this sector. The impact of climate variations and consequent fall in the yield, high density of population and resultant pressure on land is increasing, rapidly making farming in the State a non profitable vocation. A paradigm shift is required to transform the traditional system of agriculture to a modern sector through the adoption of science-based technology, thereby enhancing quality and quantity of agricultural commodities and services with social enhancements. Self reliance in the matter of food should be the chief focus inorder to ensure food security and tackle the rising prices of food commodities in the State.

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